POLLUTION PREVENTION PROGRAM
U.S. ARMY GARRISON MANNHEIM

POLLUTION PREVENTION MANAGEMENT PLAN (P2MP)
FINAL

Contract No. DACA90-00-D-0038

Delivery Order 0048

AMEC Project No. 074230048G

Prepared for:

U.S. Army Corps of Engineers,
Europe District
Konrad-Adenauer-Ring 39
D-65187 Wiesbaden

Prepared by:

AMEC
Earth & Environmental GmbH
Eschborner Landstraße 42-50
D-60489 Frankfurt/Main

September 2005

RECORD OF REVISIONS

Revision No.	Date	Name and Title	Signature	Changes	Pages Affected
1	25-Oct-05	Ulrike Martin, Env. Eng.		Change from 293d BSB into USAG Mannheim	Whole document
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					

TABLE OF CONTENTS

INDEX OF TABLES

ABBREVIATIONS AND ACRONYMS

AAFES	Army and Air Force Exchange Service
AMEC	AMEC Earth & Environmental GmbH
AOAP	Army Oil Analysis Program
AP	Affirmative Procurement
AR	Army Regulation
BImSchV	*Bundesimmissionsschutzverordnung*
BMP	Best Management Practice
CARC	Chemical Agent Resistant Coating
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CO	Carbon Monoxide
CSG	Customer Service Group
CY	Calendar Year
DCA	Directorate of Community Activities
DoD	Department of Defense
DPW	Directorate of Public Work
DRMO	Defense Reutilization and Marketing Office
EMD	Environmental Management Division
EO	Executive Order
EPA	Environmental Protection Agency
EPAS	Environmental Performance Assessment System
EPAR	Environmental Performance Assessment Report
EPCRA	Emergency Planning and Community Right-to-Know Act
EPR	Environmental Program Requirement
EQ	Environmental Quality
EQCC	Environmental Quality Control Committee
EQR	Environmental Quality Report
FFEMA	Furniture Repair Facility, Friedrichsfeld Quartermaster Service Center
FGS	Final Governing Standards
FY	Fiscal Year
HM	Hazardous Material(s)
HQDA	Headquarters Department of the Army
HS	Hazardous Substance(s)
HW	Hazardous Waste(s)
HWAP	Hazardous Waste Accumulation Point

ABBREVIATIONS AND ACRONYMS
(*continued)*

HWMP	Hazardous Waste Management Plan
HWSA	Hazardous Waste Storage Area
ICAP	Installation Corrective Action Plan
IPR	In Progress Report
kg	Kilogram
km	Kilometers
lbs	Pounds
MACOM	Major Army Command
MAM	Maintenance Activity Mannheim
MLC	Mannheim Laboratory Center
MoM	Measures of Merit
MSC	Major Subordinate Commands
N/A	Not Applicable
NEPA	National Environmental Policy Act
NO_X	Nitrogen Oxides
O&M	Operation & Maintenance Division
ODC	Ozone Depleting Chemical
ODS	Ozone Depleting Substances
P2	Pollution Prevention
P2MP	Pollution Prevention Management Plan
P2O	Pollution Prevention Opportunity
P2OA	Pollution Prevention Opportunity Assessment
PM	Particulate Matter
POL	Petroleum, Oil, and Lubricants
QT	Quart
RCO	Regional Contracting Office
RCRA	Resource Conservation and Recovery Act
RIG	Recycling Information Guide
SMT	*Süd-Müll GmbH + CO.KG für Abfalltransporte und Sonderabfallbeseitigung*
SO_2	Sulfur Dioxide
SORT	Separate or Recycle Trash
SSSC	Self Service Supply Center
SWAR	Solid Waste Annual Report
TACOM	U.S. Army's Tank-automotive and Armaments Command

ABBREVIATIONS AND ACRONYMS
(*continued)*

TRI	Toxic Release Inventory
TÜV	*Technischer Überwachungsverein*
USAG	U.S. Army Garrison
USAREUR	U.S. Army, Europe
UST	Underground Storage Tanks
VOC	Volatile Organic Compound
UFR	Unfunded Requirement
WD CARC	Water Dispersible Chemical Agent Resistant Coating
yr	Year

Summary of Pollution Prevention Goals

Regulatory guidance and requirements for pollution prevention (P2) practices at the U.S. Army Garrison (USAG) Mannheim stem from environmental legislation enacted in both the United States and Germany. Guidance on P2 practices at Army installations is available within several documents. Detailed information on Army P2 guidance and requirements is included in Chapter 2 of this Pollution Prevention Management Plan (P2MP).

P2 goals have been developed based on the current regulatory guidance and regulations. The following table illustrates the P2 goals that guide activities at the USAG Mannheim and provide a framework for the P2 program.

Table 1. Summary of Pollution Prevention Goals

Media	Goal	Source of Goal	Baseline Year	Target Year
Hazardous Waste	Continuous annual reduction in disposal	Proposed DoD MoM	CY 2004	NA
Solid Waste	Continuous reduction in solid waste generation per capita Continuous increase in the portion of solid waste diverted	DoD MoM	FY 2004	NA
Air Emissions	Continuous annual reduction in emissions	DoD MoM	FY 2004	NA
Wastewater Generation	Continuous annual reduction in wastewater generation	---	FY 2004	NA
Energy	Reduction in facility energy consumption by 30%	EO 13123	1985	2005
	Reduction in facility energy consumption by 35%	EO 13123	1985	2010
Affirmative Procurement (AP)	Train procurement officers and integrate AP into developing plans, work statements, and specifications	EO 13148	NA	NA

PROJECT SUMMARY TABLES

Table 2 lists already implemented P2 projects or P2 projects that are currently in progress.

The funding source of projects eligible for environmental financial support is indicated in the following table as Environmental Program Requirement (EPR) submission. The funding source of projects not eligible for environmental financial support is indicated as Unfunded Requirement (UFR) request.

Table 2. Project Summary Table of Implemented and Ongoing P2 Projects[1]

Project Name	Targeted Pollution Source	Implement. Status and Date[2]	Location	Funding Source	Compliance Through P2?	P2 Plan Section
Hazardous Waste						
Reuse Center at Spinelli Barracks	Various Hazardous Materials (HM)	Implemented	Reuse Center at Spinelli Barracks, Bldg 1560	UFR	N/A	5.4.1
Aqueous part cleaner	Used solvent	Implemented	Almost all motor pools	UFR	N/A	5.4.2
Can crusher	POL contaminated empty metal cans	Implemented	MAM, Bldg. 428, Taylor Barracks, 2/502nd Aviation Regiment, Bldg. 4a, Coleman Barracks	UFR	N/A	5.4.3
Aerosol can puncturing unit	Aerosol cans	Implemented	515th Maintenance Company, Bldg. 1504c, Spinelli Barracks	UFR	N/A	5.4.4
Oil filtering device	Waste oil	Implemented	2/502nd Aviation Regiment, Bldg. 4a, Coleman Barracks,	UFR	N/A	5.4.5

[1] Data based on P2 projects proposed in the P2MP from June 1999 and on information collected during various site visits.

[2] Date of project funding was not available since many of the projects were not centrally funded and no records are maintained.

Table 2. Project Summary Table of Implemented and Ongoing P2 Projects[1]

Project Name	Targeted Pollution Source	Implement. Status and Date[2]	Location	Funding Source	Compliance Through P2?	P2 Plan Section
Antifreeze recycling	Used antifreeze	Implemented[3]	Grünstadt AAFES Depot, Bldg. 3570	UFR	N/A	5.4.6
Bulk POL dispensing systems	POL contaminated solids	Implemented	Skill Development Center, Bldg. 426, Taylor Barracks AAFES Car Care Center, Bldg. 351, Taylor Barracks 7th ARCOM ESS-X, Bldg. 1572, Spinelli Barracks	UFR & EPR	N/A	5.4.7
Waste oil collection devices	POL contaminated solids	Implemented	Skill Development Center, Bldg. 426, Taylor Barracks AAFES Car Care Center, Bldg. 351, Taylor Barracks	UFR	N/A	5.4.8
Automatic paint gun washer	Used solvent	Implemented	2/502nd Aviation Regiment, paint booth, Bldg. 26, Coleman Barracks	UFR & EPR	N/A	5.4.9
Biological part cleaner	Solvents	Implemented	Skill Development Center, Bldg. 426; Taylor Barracks BASOPS-CST Mannheim, Bldg. 1563, Spinelli Barracks	UFR	N/A	5.4.10
Use of Smaller Sized Containers	Used paint	Implemented	DPW Warehouse, Bldg. 374, Taylor Barracks	UFR	N/A	5.4.11
Reuse of Paint	Used paint	Implemented	DPW Self Help Shop, Bldg. 374, Taylor Barracks	No funding required	N/A	5.4.11

[3] Currently not in operation since it seems to be not profitable anymore.

Table 2. Project Summary Table of Implemented and Ongoing P2 Projects[1]

Project Name	Targeted Pollution Source	Implement. Status and Date[2]	Location	Funding Source	Compliance Through P2?	P2 Plan Section
Reuse of US-manufactured compressed gas cylinders through DRMO	Compressed gas cylinders	Implemented	USAG wide	No funding required	N/A	5.4.12
Substitution of U.S. Gas Cylinders with German Gas Cylinders	Compressed gas cylinders	Implemented	DPW Welding Shop, Bldg. 359, Taylor Barracks	UFR	N/A	5.4.13
Procurement of reusable fire extinguishers	Fire extinguishing canisters and residue	Implemented	Several units, e.g. 28th Transportation Battalion, Bldg. 1344, Coleman Barracks	UFR	N/A	5.4.14
Substitution of oil-based paint with water-based paint	Paint and solvent	Implemented	MAM, Bldg. 429, Taylor Barracks 512th Maintenance Company, Bldg. 1852, Spinelli Barracks (painting performed by MAM	UFR (funding through facilities)	N/A	5.4.15
Non-Hazardous Solid Waste						
SORT Center	Solid waste	Implemented	USAG wide	UFR	N/A	6.4.1
Recycling Information Guide (RIG) – Recycling Program	Solid waste	Implemented	USAG wide	EPR	N/A	6.4.2
Electronic waste disposal through DRMO	Electronic waste	Implemented	SORT Center, Bldg. 405b, Taylor Barracks	UFR	N/A	6.4.3
Air Emissions						
Replacement of ODS I equipment	Air emissions	Implemented	Coleman, Sullivan, Taylor, Spinelli Barracks	UFR	N/A	7.3.1

Table 2. Project Summary Table of Implemented and Ongoing P2 Projects[1]

Project Name	Targeted Pollution Source	Implement. Status and Date[2]	Location	Funding Source	Compliance Through P2?	P2 Plan Section
Obtain full permit for engine test stand	Air emissions	Ongoing	MAM, Bldg. 429, Taylor Barracks	UFR	N/A	7.3.2
Upgrade air treatment system	Air emissions	Implemented	Friedrichsfeld QM Service Center, Bldg. 1042	UFR	N/A	7.3.3
Water and Wastewater						
Procurement of water saving appliances	Water	Ongoing	USAG wide	UFR	N/A	8.2.1
Awareness program	Water	Ongoing	USAG wide	UFR	N/A	8.2.2
Vehicle Fuel						
No action yet						
Energy						
Energy manager	Energy consumption	Implemented	USAG wide	UFR	N/A	10.3.1
Awareness programs	Energy consumption	Ongoing	USAG wide	UFR	N/A	10.3.2
Installation of photovoltaic panels	Energy consumption	Implemented	Bldg. 57, 87, 88, and 99, Coleman Barracks	UFR	N/A	10.3.3
Affirmative Procurement						
Guidelines for procurement of water and energy saving appliances	Drinking water consumption	Ongoing	USAG wide	UFR	N/A	11.2.1

Table 3 provides P2 projects that are proposed in the Pollution Prevention Opportunity Assessment (P2OA) Report, June 2005. The funding source of projects eligible for environmental financial support is indicated in the following table as EPR submission. The funding source of projects not eligible for environmental financial support is indicated as UFR request.

For UFR projects, no date to request funding or expected date to receive funding could be determined since most UFR funded project should be implemented and funded by the units or facilities themselves. However, it is anticipated to stress the planned implementation date given in the following table for UFR projects through support of relevant units and organizations by the USAG Mannheim P2 Manager or EMD personnel.

Table 3. Project Summary Table of Potential P2 Projects (Mainly Proposed in P2OA Report, June 2005)

Project Name	Targeted Pollution Source	Implement. Status	Potential Locations	Funding Source	Date to Request Funding	Expected Date to Receive Funding	Planned Implement. Date	Compliance Thru P2?	P2 Plan Section
Hazardous Waste									
Oil collection or suction device	POL contami-nated solids	Implemented at some facilities (see Table 2)	Motor pools	EPR	Nov 2005	Nov 2007	Dec 2007	N/A	5.4.8
Biological part cleaner	Used solvent	Implemented at some facilities (see Table 2)	Motor pools	EPR	Nov 2005	Nov 2007	Dec 2007	N/A	5.4.10
Procurement of reusable fire extinguishers	Fire extin-guishing canisters and residue	Implemented at several facilities	USAG wide	UFR (funding through facilities)	N/A	N/A	April 2006	N/A	5.4.14

Table 3. Project Summary Table of Potential P2 Projects (Mainly Proposed in P2OA Report, June 2005)

Project Name	Targeted Pollution Source	Implement. Status	Potential Locations	Funding Source	Date to Request Funding	Expected Date to Receive Funding	Planned Implement. Date	Compliance Thru P2?	P2 Plan Section
Substitution of oil-based paint with water-based paint	Paint and solvent	Ongoing (test phase)	2/502nd Aviation Regiment, Bldg. 26, Coleman Barracks, DPW Paint Shop, Bldg. 359, Taylor Barracks	UFR (funding through facilities)	N/A	N/A	Aug 2006	N/A	5.4.15
Proper HM Management / Procurement of German Products	All HM	No action yet	USAG wide	UFR (funding through facilities)	N/A	N/A	Dec 2007	N/A	5.5.1
Fuel tank and dispensing system	Waste fuel	Pursuing funding	2/502nd Aviation Regiment, Bldg. 26, Coleman Barracks	UFR	N/A	N/A	Dec 2007	N/A	5.5.2
Bypass filters	Waste oil	No action yet	Transportation units	EPR	Nov 2005	Nov 2007	Dec 2007	N/A	5.5.3
Reusable oil filters	Oil filters	No action yet	Transportation units	EPR	Nov 2005	Nov 2007	Dec 2007	N/A	5.5.4
Washable rags	POL contamin-ated solids	Pursuing funding	Motor pools	UFR (funding through facilities)	N/A	N/A	Aug 2005 (at MAM)	N/A	5.5.5
Non-Hazardous Solid Waste									
Tire mounting machine	Tires with/ without rims	Pursuing funding	SORT Center	EPR	Nov 2005	Nov 2007	Dec 2007	N/A	6.5.1

Table 3. Project Summary Table of Potential P2 Projects (Mainly Proposed in P2OA Report, June 2005)

Project Name	Targeted Pollution Source	Implement. Status	Potential Locations	Funding Source	Date to Request Funding	Expected Date to Receive Funding	Planned Implement. Date	Compliance Thru P2?	P2 Plan Section
Office recycling initiative	Refuse	In progress	USAG wide	IMPAC card	N/A	N/A	Dec 2005	N/A	6.5.2
Air Emissions									
General P2 Opportunities	Air emissions	Partly implemented	USAG wide	UFR	N/A	N/A	April 2006	N/A	7.4.1
Raise bakery stack	Air emissions	Partly implemented	Grünstadt AAFES Depot	UFR (funding through facilities)	N/A	N/A	Dec 2007	N/A	7.4.2
Water and Wastewater									
Installation of water metering	Water	Pursuing funding	Housing	UFR	N/A	N/A	Dec 2007	N/A	8.3.1
Fuel									
Awareness program	Vehicle fuel	Ongoing	USAG wide	UFR	N/A	N/A	April 2006	N/A	9.4.1
Develop fleet procurement guidelines	Vehicle fuel	No action yet	USAG wide	N/A	N/A	N/A	April 2006	N/A	9.4.2
Provide on-site diesel fueling stations	Vehicle fuel	No action yet	USAG-wide	UFR	N/A	N/A	Dec 2009	N/A	9.4.3

Table 3. Project Summary Table of Potential P2 Projects (Mainly Proposed in P2OA Report, June 2005)

Project Name	Targeted Pollution Source	Implement. Status	Potential Locations	Funding Source	Date to Request Funding	Expected Date to Receive Funding	Planned Implement. Date	Compliance Thru P2?	P2 Plan Section
Energy									
Energy awareness programs	Energy	Partly implemented	USAG wide	UFR	N/A	N/A	April 2006	N/A	10.3.2
Installation of photovoltaic panels	Energy	Implemented at some facilities (see Table 2)	USAG wide	UFR	N/A	N/A	Dec 2007	N/A	10.3.3
Inspection and repair of compressed air systems	Energy	No action yet	USAG wide	UFR	N/A	N/A	Dec 2007	N/A	10.4.1
Installation of utility metering	Energy	Pursuing funding	USAG wide	UFR	N/A	N/A	Dec 2007	N/A	10.4.2
Lighting conservation	Energy	In progress	USAG wide	UFR	N/A	N/A	Dec 2007	N/A	10.4.3
Inspection and repair of refrigeration units	Energy	No action yet	Grünstadt AAFES Depot	UFR (funding through facilities)	N/A	N/A	Dec 2007	N/A	10.4.4
Inspection and repair of boiler piping	Energy	No action yet	Grünstadt AAFES Depot	UFR (funding through facilities)	N/A	N/A	Dec 2007	N/A	10.4.5

Table 3. Project Summary Table of Potential P2 Projects (Mainly Proposed in P2OA Report, June 2005)

Project Name	Targeted Pollution Source	Implement. Status	Potential Locations	Funding Source	Date to Request Funding	Expected Date to Receive Funding	Planned Implement. Date	Compliance Thru P2?	P2 Plan Section
Roof repairs	Energy	No action yet	Grünstadt AAFES Depot	UFR (funding through facilities)	N/A	N/A	Dec 2007	N/A	10.4.6
Consolidate / construct storage facilities	Energy	No action yet	Grünstadt AAFES Depot	UFR (funding through facilities)	N/A	N/A	Dec 2007	N/A	10.4.7
Install heat recovery units	Energy	No action yet	Grünstadt AAFES facilities	UFR (funding through facilities)	N/A	N/A	Dec 2007	N/A	10.4.8
Affirmative Procurement									
Fleet procurement guidelines	Vehicle fuel	No action yet	USAG wide	UFR	N/A	N/A	Dec 2007	N/A	11.3.1
Awareness Program for Integration of Affirmative Procurement	Conserving resources	No action yet	USAG wide	UFR	N/A	N/A	Dec 2007	N/A	11.3.2

1 INTRODUCTION

1.1 STATEMENT OF PURPOSE

This Plan establishes the commitment of the USAG Mannheim, Mannheim to environmental leadership in pollution prevention (P2) by outlining the concepts and practices necessary to reduce the use of hazardous materials and the release of pollutants. This Plan is also meant to be used as a tool for the USAG to document, track, and manage its P2 efforts in pursuit of achieving P2 goals.

This Pollution Prevention Management Plan (P2MP) is prepared in accordance with requirements of the applicable components of Headquarters Department of the Army (HQDA) Pollution Prevention Plan Guidance (June 2001). The plan will serve as a single reference document to manage the actions and programs needed to develop and execute the USAG's P2 program. The Integrated P2MP will document current and planned future USAG P2 actions, addressing the following program elements:

1) Hazardous waste and hazardous material

3) Non-hazardous solid waste

4) Air emissions

5) Water and wastewater

6) Fuel

7) Energy

8) Affirmative procurement

In addition to the P2 alternatives identified during the Pollution Prevention Opportunity Assessment (P2OA), P2 ideas ("options") not yet implemented, such as P2 projects currently programmed and funded but not yet accomplished, are documented. Payback options for each P2 alternative are calculated as follows:

$$\frac{\text{Start-up Costs [Euro]}}{\text{Avoided Costs per year [Euro/yr]} - \text{Annual Costs per year [Euro/yr]}} = \text{Payback Period in years [yrs]}$$

A summary worksheet documenting policy goals, baselines, requirements, benefits by fiscal year, and costs by fiscal year is developed.

The objectives of the P2MP are to:

- Document relevant P2 baselines;
- Identify and prioritize potential P2 projects; and
- Develop funding strategies and implementation time lines for prioritized projects.

1.2 BACKGROUND AND MISSION

The USAG Mannheim is located in three different German states:

Baden Württemberg

- Benjamin Franklin Village, GE07P
- Coleman Barracks, GE140
- Friedrichsfeld Quartermaster Service Center, GE27S
- Friedrichsfeld Storage Area, GE27T
- Funari Barracks, GE28T
- Mannheim Class III Point, GE52F
- Spinelli Barracks, GE79R
- Sullivan Barracks, GE82J
- Taylor Barracks, GE83C
- Turley Barracks, GE856

Hessen

- Lampertheim Training Area, GE478

Rheinland Pfalz

- Grünstadt Army and Air Force Exchange Service (AAFES) Depot, GE32H
- Grünstadt Communication Site, GE32F
- Dannenfels Communication Site, GE15F

The military and German address for the USAG Mannheim is as follows:

USAG Mannheim Unit 29901, APO AE 09086 Mannheim, Germany	USAG Mannheim Postfach 410204 68276 Mannheim

The USAG's daily mission is to provide comprehensive base operations, support to units and individual residents of the community. In addition, the USAG provides direct combat service/contingency support and reception, staging, and onward movement to units located in or passing through the assigned area of responsibility, while shaping a capability to meet future requirements.

1.3 DEFINITION OF POLLUTION PREVENTION

P2 encompasses those activities which reduce the quantity of hazardous, toxic, or industrial pollutants at the source by changing the production, industrial, or other waste generating process. In addition, P2 is not limited to hazardous pollutants released to air, water, and land, but also includes activities to reduce the amounts of non-hazardous commercial and household wastes.

P2 is any mechanism that successfully and cost-effectively avoids, prevents, or reduces the sources of pollutant discharges or emissions other than the traditional method of treating pollution at the discharge

end of a pipe or stack. A P2 project is one which applies source reduction, recycling, or waste minimization in order to reduce pollution from current business practices, industrial processes, base operations, or other routine activities.

1.4 BENEFITS OF POLLUTION PREVENTION

As concern for the environment has risen in our society, increased environmental regulation and public awareness have raised the standards, costs, and potential liabilities of waste management practices. Waste and resource management programs that adopt P2 principles can realize benefits on many different fronts:

- Reduced costs associated with the procurement and storage of hazardous materials and subsequent disposal of hazardous waste
- Reduced costs associated with the management, treatment, and disposal of hazardous wastes
- Decreased use of energy and water resources
- Enhanced relations with the public, neighboring communities, and regulators
- Reduced costs of complying with environmental and hazardous materials regulations, and diminished risk of non-compliance
- Reduced future compliance liability
- Improved long-term environmental quality and prevention of environmental degradation

2 POLLUTION PREVENTION REGULATORY BACKGROUND

The Army's P2 policies originate in legislation enacted by the U.S. Congress. Executive Orders (EOs) direct federal agencies, including the Department of Defense (DoD), to conform to Federal legislation and may impose non-legislated requirements as well. The DoD issues directives and instructions in response to the EOs. These DOD policy statements are interpreted and promulgated in Army regulations (ARs), pamphlets, and other policy documents. In addition, Major Army Commands (MACOMs), Major Subordinate Commands (MSCs), and individual USAGs may adopt supplemental policies. This section provides summaries of the major laws, EOs, and DOD policy statements pertaining to P2. Due to the wide-reaching nature of P2 issues and frequent changes to laws and regulations, the list is not intended to be all-inclusive.

2.1 FEDERAL LEGISLATION

2.1.1 Resource Conservation and Recovery Act (RCRA) of 1976

An early legal impetus for P2 practices. "...It shall be a condition of any permit issued under this section for the treatment, storage, or disposal of hazardous waste on the premises where such waste was generated that the permitee certify, no less often than annually, that the generator of the hazardous waste has a program in place to reduce the volume or quantity and toxicity of such waste to the degree determined by the generator to be economically practicable."

2.1.2 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980

This act required that generators of hazardous wastes must evaluate and document their procedures for controlling the environmental impacts of their operations.

2.1.3 Hazardous and Solid Waste Amendments (HSWA) of 1984

This act required all RCRA-regulated generators of hazardous waste to develop waste minimization programs.

2.1.4 Pollution Prevention Act of 1990

Facilities required to report releases for the Toxic Release Inventory (TRI) under the Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 must provide documentation of their procedures for preventing the release of or for reusing these materials. However, this act goes beyond wastes designated as hazardous. The intent is to force industries to reduce or prevent pollution at the source. In addition to source reduction, it also emphasizes reuse and closed loop recycling whenever possible. The emphasis is fundamentally different from off-site recycling, treatment, and disposal as primary ways to handle waste. The Pollution Prevention Act was first established as a comprehensive national policy, the pollution protection hierarchy is described in Chapter 1.

2.2 PRESIDENTIAL EXECUTIVE ORDERS

2.2.1 Executive Order 13101, "Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition," September 1998

This EO requires federal agencies to implement acquisition programs aimed at procuring products that are environmentally preferable, energy efficient, and/or contain post-consumer recovered materials. This EO supersedes EO 12873.

2.2.2 Executive Order 13123, "Greening the Government through Efficient Energy Management," June 1999

This EO establishes requirements with the intention to encourage efficient energy management in the Federal Government. Specific goals of this EO include:

- Reduce greenhouse gas emissions from facility energy use 30% by 2010 from a 1990 baseline
- Reduce facility energy consumption 30% per square foot by 2005 and 35% by 2010 from a 1985 baseline
- For industrial and laboratory activities, reduce energy consumption 20% by 2005 and 25% by 2010 from a 1990 baseline.

2.2.3 Executive Order 13148, "Greening the Government Through Leadership in Environmental Management," April 2000

By including many of the P2 elements of several previously existing EOs, this EO revokes the following: Executive Order 12843 of April 1993, Executive Order 12856 of August 1993, Executive Order 12969 of August 1995, and section 1-4 "Pollution Control Plan" of Executive Order 12088 of October 1978. Executive Order 13148 establishes goals that involve establishing environmental management programs as well as goals that involve reaching measurable P2 milestones. Goals pertaining directly to P2 are:

- Reduce TRI Form R releases 10% annually or 40% by 31 December 2006 from a baseline year of 2001. In addition to this reduction goal, note that this EO requires federal facilities to be in compliance with the requirements of the EPCRA.
- Reduce the use of Environmental Protection Agency (EPA) priority chemicals 50% by 31 December 2006. Note that the EPA Interagency Workgroup has not yet established the list of priority chemicals. The EO allowed the workgroup until February 2001 to complete the list. The baseline year for the 50% reduction will be the calendar year immediately following the year in which the workgroup establishes the priority chemical list.
- Develop a plan to phase-out the procurement of Class I Ozone Depleting Substances (ODS) by 31 December 2010. The facility must develop this plan by 31 April 2001. Note that the Army established a goal to eliminate all ODS from each Army installation by 31 December 2003 and to develop the phase-out plan by 30 September 2000 (discussed further below).
- Develop a plan that addresses the facility's contribution toward achieving the goals in this EO. This plan must be developed by March 2002. Note that this P2MP satisfies this requirement.

- Determine the feasibility of implementing a hazardous material pharmacy system at the facility. The facility must make this determination by April 2002.

- Institute environmentally and economically beneficial practices pertaining to landscaping activities. These practices must be based upon the Guidance for Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds (60 Fed. Reg. 40837). Landscaping activities must conform to this guidance by October 2001.

2.2.4 Executive Order 13149, "Greening the Government Through Federal Fleet and Transportation Efficiency," April 2000

This EO establishes goals to improve the average fuel economy and to increase the use of alternative fuels for fleet vehicles. Note that this EO exempts tactical military vehicles, law enforcement vehicles, and emergency vehicles from its requirements. In addition, this EO supersedes EO 13031 of December 1996. This order established the following specific goals:

- Reduce vehicle petroleum consumption 20% by the end of fiscal year (FY) 2005 from an FY 1999 baseline.

- Increase the average EPA fuel economy rating of cars and light trucks by at least 1 mile per gallon (mpg) by the end of FY 2002 and by 3 mpg by the end of 2005 from an FY 1999 baseline.

- Ensure that alternative fuels account for at least 50% of the fuels used in dual-fuel, alternative fuel vehicles.

- Ensure that at least 75% of car and light truck procurements are alternatively-fueled vehicles.

2.3 DEPARTMENT OF DEFENSE (DOD) DIRECTIVES AND INSTRUCTIONS

2.3.1 DoD Instruction 4715.4, "Pollution Prevention," June 1996.

This document provides explicit guidance on P2 activities. It reiterates the P2 Hierarchy principle, and establishes the DoD P2 measures-of-merit for TRI releases reduction, hazardous waste reduction, non-hazardous solid waste diversion, and alternatively-fueled vehicles. Note that the TRI and hazardous waste reduction goals became obsolete on 31 December 1999. As a result, the DoD is currently developing new measures of merit that will be incorporated into this P2MP as soon as they become available.

2.3.2 DoD Pollution Prevention and Compliance Metrics, October 2004.

DoD established these metrics to measure progress in the Pollution Prevention and Compliance programs in support of the defense mission. Each program area has a set of broad overall goals with specific metrics to measure DoD's progress towards meeting the goals. The metrics process requires continuous review and periodic adjustments, as necessary. The Pollution Prevention and Compliance programs focus on enhancing and sustaining the mission by:

- Supporting the war fighter today and in the future

- Ensuring adequate resource capability for the war fighter

- Improving human health and the environment
- Influencing the acquisition and weapon system life-cycle process
- Making efficient investments in P2
- Conducting operations in a cost effective manner

2.3.3 Memorandum, Assistant Secretary for Installations, Logistics, and Environment, "Ozone-Depleting Chemicals (ODC) Elimination at Army Installations," 13 February 1996.

With this memorandum, the Assistant Secretary of the Army for Installations, Logistics, and Environment established an Army-wide goal to completely eliminate Class I ODS from all Army installations by 31 December 2003.

2.4 U.S. ARMY REGULATIONS AND GUIDANCE

2.4.1 AR 200-1 Environmental Protection and Enhancement, 21 February 1997

This regulation provides a brief overview of environmental programs and requirements. It does not provide a complete listing of requirements or detailed guidance on complying with environmental laws and regulations. This regulation supplements Federal, state, and local environmental laws for preserving, protecting, and restoring the quality of the environment. It also integrates P2, natural and cultural resources, and the National Environmental Policy Act (NEPA) into the Army Environmental Program.

2.5 FINAL GOVERNING STANDARDS (FGS) FOR GERMANY

2.5.1 FGS Chapter 18, "Spill Prevention and Response Planning", January 2003

This chapter contains criteria to plan for, prevent, control, and report spills of POL and hazardous substances.

2.6 GERMAN POLLUTION PREVENTION LEGISLATION

2.6.1 Bundes-Bodenschutzgesetz (BBodSchG). Federal Soil Protection Act, 17 March 1998

The goal of this federal law is to protect or reinstall the lasting function of the soil. The key elements are to prevent harmful soil disturbance; prevention of threats to receptors (i.e., groundwater, human health, agriculturally used plants) potentially deriving from contaminated soils via different receptor pathway scenarios; remediation of soil and soil contamination; prevention of soil damage; and agricultural soil utilization.

2.6.2 Bundes-Immissionsschutzgesetz (BImSchG). Act to Reduce the Impact of Air Pollution, Noise Pollution, and Vibration, 14 May 1990

This law aims to reduce the impact of atmospheric emissions, noise, and vibration on the human and natural environment.

2.6.3 Kreislaufwirtschafts- und Abfallgesetz (KrW-/AbfG). Act on the Avoidance and Elimination of Waste, 3 May 2000

This law regulates disposal of ordinary and hazardous waste to protect human health and environmental resources. It states the principle “prevention before recycling, before disposal”. The law also regulates the proper disposal of waste oil and requires companies selling oil to accept waste oil for recycling.

3 USAG MANNHEIM POLLUTION PREVENTION PROGRAM

3.1 POLICY

The USAG Mannheim is committed to an active policy of protecting the environment through the following efforts:

- Providing a clean and safe environment in our community
- Ensuring a safe and healthy workplace for our staff
- Complying with all applicable laws and regulations
- Reducing the use of hazardous substances
- Reducing releases of pollutants to the environment
- Conserving energy and natural resources
- Maximizing recycling efforts
- Promoting P2 through education, training, and awareness

To accomplish these objectives, the USAG Mannheim continuously identifies opportunities to reduce or eliminate pollution through source reduction and other prevention methods. This policy extends to all environmental media including hazardous waste, solid waste, air, water, and wastewater.

The USAG Mannheim is committed to reducing the amount and toxicity of pollution that it generates. As part of this commitment, the USAG gives priority to source reduction. Where source reduction is not feasible, the USAG Mannheim will investigate and implement other prevention measures such as recycling, treatment, and controlled disposal.

P2 is the responsibility of everyone at the USAG Mannheim.

3.2 POLLUTION PREVENTION MANAGEMENT STRUCTURE

The USAG Mannheim manages its overall environmental program through a series of defined responsibilities. As an aspect of the environmental program, the USAG also manages its P2 program in this manner. The various levels of responsibility for environmental management are as follows:

3.2.1 Command Level

With regards to the environmental program, USAG command personnel are responsible for establishing overall policies, instituting regulations, and setting goals. In addition, they are responsible for establishing budgets and authorizing funding for the overall program and for specific projects. Command and Directorate level personnel stay involved in environmental activities primarily through regular meetings of USAG Environmental Quality Control Committee (EQCC) which meets once per quarter.

3.2.2 Primary Level

The Directorate of Public Works (DPW) Environmental Management Division (EMD) maintains the principal responsibility for environmental oversight and management. The DPW EMD consists of personnel who are each responsible for managing various environmental programs such as P2, hazardous waste and hazardous material, solid waste, air emissions, above and underground storage tanks (USTs), etc.

3.2.3 Task Level

This level consists mostly of contracted organizations that provide the USAG with a specific work product. Some examples may include the various contractors that develop the Management Plans.

3.2.4 Resource Level

Resources are typically regarded as various personnel on post who have environmental training, experience, or knowledge and can contribute to specific aspects of environmental program management. Resources include those with extensive environmental knowledge who may lend advice and assistance to that program's manager.

3.2.5 Operator Level

This level of personnel has the responsibility of providing technical information about the existing processes and potential process changes to operations and waste generation activities to the primary level personnel. Some specific examples of this level include for example the DPW Operation & Maintenance Division (O&M) or DPW shop personnel.

3.3 BASELINE DEVELOPMENT

The baselines for the USAG's P2 objectives are primarily derived from the pollution reduction goals established by "Greening of the Government" EOs and the DoD Pollution Prevention and Compliance Metrics from October 2004. These baselines are based on the following metrics and are quantitatively identified in Chapter 5 to 11 of this plan.

- Hazardous wastes generated and associated disposal costs;
- Non-hazardous solid wastes generated and diverted, and associated disposal and diversion costs;
- Potential sources and types of air emissions;
- Water use and wastewater generation;
- Vehicle fuel use; and
- Electricity used.

3.4 OPPORTUNITY ASSESSMENTS

When reduction requirements are determined, options for meeting the requirements must be identified. These options are identified through P2OAs. P2OAs examine current processes and identify and evaluate alternatives for P2. Projects identified by P2OAs must have complete data to show the cost benefit of the project.

P2OAs are the method of identifying process improvements or options. Conducting a P2OA involves examining all input sources, material usage, and waste generation by type and weight, and determining practical and economical options for reduction. This generally involves examining each process involving a targeted substance to determine ways to avoid use or minimize generation of that substance. Detailed baseline information characterizing material use and waste streams for each process may be gathered concurrently with the assessment process. P2OAs may be performed by trained post level, MACOM personnel, or contractors and, to be effective, must have the involvement of process-level personnel. Chapters 5 to 11 of this document represent the results of the most recent P2OA for each chapter's respective media.

3.5 POLLUTION PREVENTION GOALS

Chapters 5 to 11 of this plan describe the USAG's P2 goals with respect to each environmental media area. The USAG developed these goals based on environmental laws, EOs, and DoD policies.

3.6 IMPLEMENTATION AND EVALUATION

This section describes some of the methods and tools the USAG uses to track and document its environmental efforts such as P2 projects and initiatives.

3.6.1 Environmental Quality Report

This report is part of an automated system used to collect a wide variety of USAG environmental information, including compliance, conservation, program management, and P2 programs. The primary goal of an Environmental Quality Report (EQR) is to provide DoD with the information it requires as well as providing HQDA, MACOM, MSC, and USAGs with critical management information while minimizing short suspense tasking to USAG personnel. The EQR program is a result of the 1996 Defense Environmental Quality Program Annual Report to Congress, RCS DD-A&T (A) 1997. All data elements in the EQR are based on the DoD RCS-A&T (A) 1997 reporting protocol, and other law(s) and regulation(s) reporting requirements. All of which provide users and policy makers with periodic updates on critical data within the Army's environmental program. The EQR serves as the source of data for: annual environmental quality (EQ) reports to Congress; semi-annual EQ reports to the DoD; quarterly reports for the Quarterly Army Performance Review; MACOM EQ IPRs; USAG Management Steering Committee meetings; and semi-annual EO reports to MACOMs.

3.6.2 Army Environmental Program Requirements

USAG personnel use the Environmental Program Requirement (EPR) database to plan, program, budget and forecast costs to manage the environment; to practice good environmental stewardship; and to attain and maintain compliance with existing and pending Federal, state, local environmental laws and regulations. It is used to show past expenditures; to track project execution and performance; to refine

and validate requirements for the budget year; and to plan and program requirements and resources in the out-years.

3.6.3 Environmental Program Assessment System

This system, known as the EPAS, is an Army-wide program that documents a USAG's compliance status on a 3-year cycle. As a component of the EPAS, assessors evaluate the USAG's P2 program in terms of its compliance with many of the directives and EOs described in Chapter 2. This evaluation is included as part of a document called the Environmental Program Assessment Report (EPAR). Each time the USAG undergoes an EPAS, the assessors write an EPAR and provide copies to the USAG and its MACOM. The USAG then works with the MACOM to develop a USAG Corrective Action Plan (ICAP). Developing the ICAP serves as an opportunity to consider and plan for P2 projects that can help to achieve and maintain compliance.

3.7 REPORTING REQUIREMENTS

The USAG has the following P2 reporting requirements:

- EQR for hazardous waste disposal and recycling roll-ups, from AR 200-1
- EPR for programming, budgeting, and execution for all environmental projects, including P2, from AR 200-1
- Solid Waste Annual Report (SWAR)
- Installation Status Report (ISR) Part II (Environment)
- EPRCA Tier I/II Reports

3.8 POLLUTION PREVENTION PROJECT FUNDING

P2 projects are funded from the appropriate account of the proponent’s operating budget. P2 projects are also funded by VEPP funds.

4 COMPLIANCE THROUGH POLLUTION PREVENTION

4.1 DESCRIPTION OF COMPLIANCE THROUGH P2

P2 can be a strong tool that a USAG can use to reduce its compliance burden. Since the concept of P2 was first introduced, it has been accepted that P2 can improve a USAG's compliance status. However, this benefit was taken as a matter of course but was not widely explored. This section represents the USAG's efforts to categorize and document its compliance benefit. The following examples illustrate the concept of compliance through prevention at hypothetical Installations and at the USAG Mannheim.

Example for hypothetical installations:

Installation A has 5 motor pools that generate used solvent as a hazardous waste. Recently, Installation X implemented a P2 initiative that could double the life of the solvent which, in turn, reduced the amount of used solvent generated by 50%. Although this initiative has obvious benefits, it does not reduce the Installation's compliance burden as much as might first be expected. This is because each of the 5 motor pools are still generating used solvent as a hazardous waste (albeit half as much). As a result, the Installation must still ensure that these 5 motor pools operate in full compliance with hazardous waste storage and handling laws. In this light, the Installation has received little compliance benefit aside from perhaps having to fill out a few less hazardous waste manifests.

Installation B also had 5 motor pools that generated used parts washing solvent as a hazardous waste. Recently, however, this installation consolidated these motor pools so that they are now housed in a single facility. This consolidation has allowed the activities to share resources which, in turn, reduced solvent use and generation by 25%. This reduction is not as much as that realized by Installation A. However, Installation B has gained a benefit in that it now only has to manage a single hazardous waste site rather than 5 separate ones. Installation B, therefore, has realized a compliance benefit by reducing the number of its compliance sites.

Installation C also has 5 motor pools that generate used solvent. This Installation has recently implement Installation A's initiative that reduced solvent use and generation by 50% at each of its motor pools. At Installation C, however, the used solvent represented a large percentage of the Installation's total hazardous waste generation. So large in fact that by reducing it by 50%, the USAG downgraded its hazardous waste generator status form large quantity generator to small quantity generator. So even though Installation C must still manage these 5 separate hazardous waste generation sites, it may do so under more relaxed standards. Installation C, therefore, has realized a compliance benefit by reducing one of its compliance thresholds.

USAG specific example:

The following provides an example for reduced compliance burden through prevention at USAG Mannheim. The 2/502nd Aviation Regiment at Coleman Barracks, Bldg. 4, built up a centralized storage area for hazardous materials (HM) (HM Pharmacy) and consolidated their HM that was dispersed throughout the shops within the 2/502nd Aviation Regiment. The HM Pharmacy serves as a single distribution place for HM used within the 2/502nd Aviation Regiment. From now on the shops only store a specific amount of HM that they need for their day to day operations. The HM Pharmacy is fully compliant with all relevant legal requirements. Through the consolidation of several smaller storage areas for HM into one HM storage area, the USAG Mannheim reduced their compliance burden by reduction of its compliance sites.

4.2 COMPLIANCE SITES

4.2.1 Hazardous Waste Storage Areas (HWSAs)

The following table is provided to track the progress that the USAG Mannheim has made in reducing its number of hazardous waste (HW) compliance sites.

Table 4. Quantity of HWSAs, HWAPs, and Satellite HWAPs

Facility Type	Quantity				
	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007
HWSAs	No HWSA operated at the USAG	No HWSA operated at the USAG			
HWAPs	33	33			
Satellite HWAPs	Approx. 50	Approx. 50			

HW that is daily generated at the USAG Mannheim is collected at satellite Hazardous Waste Accumulation Points (HWAPs) located throughout the USAG. The waste containers at these HWAPs are emptied on a daily basis and transferred to the HWAP where the waste is stored no longer than one week. The containers at the HWAPs are emptied by a HW contractor.

No HWSA is currently operated by the USAG Mannheim. However, the Defense Reutilization and Marketing Office's (DRMO) in Kaiserslautern HWSA, located at Coleman Barracks, satisfies the legal requirement of a HWSA.

4.2.2 Permitted Air Emission Sources

According to 4 BImSchV (Bundes-Immissionschutz-Verordnung), column 2, # 10.15, combustion engine test stands larger than 300 kilowatts (kW) and installed after 29 March 1998 are subject to German permits.

An engine test stand at Maintenance Activity Mannheim (MAM), Taylor Barracks, Bldg. 429 is partially permitted (Teilgenehmigung) and further steps have been undertaken to obtain a full permit. The partial permit is maintained at MAM.

All other air emissions sources located at the USAG Mannheim were either built and in operation before 1998, or do not need a permit according to 4.BImSchV.

4.2.3 Permitted Solid Waste Disposal Facilities

The USAG Mannheim does not operate a solid waste disposal facility.

5 HAZARDOUS WASTE AND HAZARDOUS MATERIALS

5.1 PREVENTION GOAL

The USAG's hazardous and industrial waste reduction goal is to show a continuous annual reduction in the overall disposal of these wastes. For the purposes of this P2MP, hazardous wastes include all wastes requiring supervision and waste requiring special supervision according to German waste requirements.

5.2 BASELINE AND PROGRESS

The HW baseline data for the USAG Mannheim is calculated and reported per fiscal year (FY). HW data per calendar year (CY) is not available for 2003 and 2004 because of the change in the HW reporting software from HOTS to HSMS.

Baseline		**Hazardous Waste [pounds (lbs) disposed per FY]**					Target: Continuous Reduction
FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 20010
644,753 [4]	930,936 [5]						

5.3 DESCRIPTION OF MAJOR WASTE GENERATING ACTIVITIES

The main hazardous waste generating activities at the USAG Mannheim are described in the following section.

5.3.1 Motor Pools

Motor pools primarily maintain all types of military vehicles. Typical HW generated at motor pools are waste oil, waste antifreeze, waste solvent, waste paint, waste batteries, and petroleum, oil and lubricant (POL) contaminated solids including oily rags, and absorbent material, oily canisters, oil filters, etc.

The following lists the main motor pools generating more than 1,000 kilograms (kg) of HW throughout the USAG Mannheim:

- Maintenance Activity Mannheim (MAM), Taylor Barracks, Bldg. 428/429

[4] From: Baseline Inventory, March 2004. Quantity does not include total quantity of waste oil generated within the USAG Mannheim and total quantity of HW generated at AAFES facilities.

[5] From: HWMP, February 2005. Quantity includes HW generated at AAFES facilities and total quantity of waste oil generated within the USAG Mannheim.

- 28th Transportation Battalion, Coleman Barracks, Bldg. 1344/ 1349/ 49
- 2/502nd Aviation Regiment, Coleman Barracks, Bldg. 4a, 1373, 26
- 512th Maintenance Company, Spinelli Barracks, Bldg. 1852/ 1857/ 1577
- 181st Transportation Battalion, Coleman Barracks, Bldg. 97 and Turley Barracks, Bldg. 471
- Directorate of Community Activities (DCA), Skill Development Center, Taylor Barracks, Bldg. 426
- 6981st Customer Service Group (CSG), Coleman Barracks, Bldg. 1395
- 44th Signal Battalion, Sullivan Barracks, Bldg. 212/ 249a
- 574th Supply Company, Spinelli Barracks, Bldg. 1560/ 1570/ 1523/ 1518
- 72nd Signal Battalion, Taylor Barracks, Bldg. 338/ 399
- 95th MP Battalion, Taylor Barracks, Bldg. 348 (HHD, 272nd MP Co, 560th MP Co)
- 1/214th Aviation Regiment, Coleman Barracks, Bldg. 57/ 87c/ 1375
- 596th Maintenance Detachment, Turley Barracks, Bldg. 464
- Dyncorp, Coleman Barracks, Bldg. 9
- Air Force (4ASOS), Sullivan Barracks, Bldg. 249a
- Headquarters & headquarters company (HHC), 7th Signal Brigade, Sullivan Barracks, Bldg. 211

5.3.2 Fire & Emergency Services Division

The Fire & Emergency Services Division, Bldg. 21 at Coleman Barracks, is responsible for inspection and maintenance of fire extinguishers. Typical waste generated and collected at the Fire & Emergency Services Division are fire extinguishing canisters, fire extinguishing residue and gas cylinders.

5.3.3 SORT Center

Smaller amounts of various types of household HW are collected at the SORT Center located at Taylor Barracks, Bldg. 405b. Typical types of HW stored at the SORT Center are electronic scrap, tires, detergents, used paint, batteries, fluorescent light tubes, freon appliances, pesticides, and glues.

5.3.4 Mannheim Laboratory Center (MLC)

The MLC located at Coleman Barracks, Bldg. 50, 52 and 60 performs tests of hazardous substances samples for U.S. Army Europe (USAREUR). Typical types of HW generated at the MLC are waste oil, waste paint and chemical agent resistant coating (CARC) paint, solvents, grease, and various other types of waste like chlorine compounds, inorganic acids, detergents, etc.

5.3.5 DPW Shops

The DPW Shops located at Taylor Barracks belong to the O&M Division and perform in-house work orders. Various types of hazardous waste like waste paint, fluorescent light tubes, and small amounts of waste oil are generated at the following DPW Shops: Paint Shop, Roads Shop, Refrigeration Shop, and Pest Control Shop.

5.3.6 AAFES, FFEMA, PX, and other industrial activities

AAFES facilities, such as Gruenstadt bakery, the AAFES Car Care Center, or the AAFES gas stations, Furniture Repair Facility (FFEMA) in Friedrichsfeld Quartermaster Service Center and PX, generated various types of waste including POL contaminated packaging materials, POL contaminated solids, used acid, used paint, used developer and fixer.

5.4 IMPLEMENTED AND ONGOING POLLUTION PREVENTION INITIATIVES

5.4.1 Reuse Center at Spinelli Barracks

Units and organizations handling HM can dispense of excess HM at the Reuse Center at Spinelli Barracks, where the excess HM is temporarily stored and made available for use by other units and organizations. This practice successfully reduces or eliminates procurement of excess HM. For this opportunity to be effective, the procurement procedure for HM should begin with contacting the Reuse Center to determine if all or part of the necessary HM is available onsite for reuse. This P2O is already implemented.

5.4.2 Aqueous Part Cleaner

Current Situation and Implementation Status/ Date:

Most units have a service contract with companies (e.g., Safety Kleen) maintaining their solvent or aqueous part cleaners and disposing of the used solvent or aqueous solution. Aqueous part cleaners are already in use at MAM, Bldg. 428 and 429, Taylor Barracks and several other motor pools. The implementation of aqueous part cleaners throughout the rest of the USAG Mannheim requires further investigation scheduled for 2005 in order to establish the type of aqueous part cleaner needed.

P2O Description:

The waterborne solvent part washer is usually under a service contract with the respective company. There are scheduled machine services and waste collections performed by the company. The company changes the solvent, empties and refills the part washer. The part washer uses an aqueous cleaning solution that is environmentally sensible, non-flammable, non-hazardous, and non-harmful. The part washer can be used to degrease a wide range of substances, including alloys, metals, and stainless steel. The cleaning solution is heated to achieve maximum cleaning effectiveness. There are automatic and manual aqueous part cleaners available.

Advantages:

- No VOC emissions.

- No HW disposal.

- Safer working environment.

Disadvantages:

- None noted.

Environmental Benefit:

- No VOC emissions.

- No HW disposal.

Economic Feasibility/ Cost Estimate:

- Service contract costs depend on the frequency and volume of use of the part washers and the need for changing the cleaning agent. A service contract for a frequently used automatic aqueous part cleaner including repair, maintenance and disposal cost is approximately 6,000 Euro per year.

5.4.3 Can Crusher

Current Situation and Implementation Status/ Date:

Empty metal containers are disposed through *Süd-Müll GmbH + CO.KG für Abfalltransporte und Sonderabfallbeseitigung* (SMT). The disposal contractor of SMT*, F.K.M Buster Altöl- und Reststoff-Entsorgung GmbH* recycles the empty metal containers.

This P2 project is completed for all applicable locations at the USAG Mannheim. However, can crushers might be needed in the future for other facilities. A can crusher is operated by MAM at Taylor Barracks, Bldg. 428 and by the 2/502nd Aviation Regiment at Coleman Barracks, Bldg. 4a.

P2O Description:

Empty metal containers (5-gallon cans or 55-gallon drums) are compressed by crushing machines at a ratio of 20:1. Metal cans or drums are enclosed in a chamber, and then are pierced and compressed. Residue liquids are collected in a basin.

Advantages:

- Reduction of storage space needed.

- Reduction of transportation.

Disadvantages:

- No cost benefit since HW is paid according to mass and not to volume.

Environmental Benefit:

- Reduction of transportation.

Economic Feasibility/ Cost Estimate:

- A can crusher for 55-gallon metal drums costs approximately 8,000 Euro.
- No payback period calculation is performed since no cost benefits can be expected.

5.4.4 Aerosol Can Puncturing Unit

Current Situation and Implementation Status/ Date:

Aerosol cans are generally disposed of as HW by the disposal contractor, SMT.

An aerosol can puncturing unit is in use at the 515th Maintenance Company, Bldg. 1504c, Spinelli Barracks. Implementation of this P2O at further locations within the USAG Mannheim is currently not recommended since the disposal of drained liquids might be expensive depending on the mixed contents. Additionally, facilities do not want to use aerosol can puncturing units since the puncturing process is time consuming.

P2O Description:

An aerosol can puncturing unit consists of the puncturing system that encloses the can in a chamber, punctures it, filters gases through an activated charcoal filter and drains any liquid into a waste drum. The punctured and drained aerosol cans can be disposed as recyclable empty metal cans. The drained liquids are collected in a waste drum. The liquid has to be tested for its contents by the MLC and then is classified and disposed of accordingly.

Advantages:

- Cost savings through separation of HW due to different classification of waste (metal can and liquid).
- Empty metal cans recycled by the disposal contractor.

Disadvantages:

- Due to the small quantity of spent aerosol cans, the procurement of an aerosol can puncturing unit per facility is not cost effective.
- The disposal of collected liquids might be expensive depending on the contents of the liquid HW.
- Cooperation from units/ facilities is required.

Environmental Benefit:

- Empty metal cans recycled by the disposal contractor.

Economical Feasibility/ Cost Estimate:

- Due to the small quantity of spent aerosol cans, the procurement of an aerosol can puncturing unit per facility is not cost effective.

- The payback period calculation below is calculated based on data from FY 2004 at the 2/502nd Aviation Regiment at Coleman Barracks, Bldg. 4b.

Table 5. Payback Calculation for Aerosol Can Puncturing Unit

Basic Parameters	**Value**
Labor cost	20 Euro/h
Labor required	0.1 h/kg
Disposal of aerosol cans	1.4 Euro/kg
Disposal of empty metal containers	0.46 Euro/kg
Disposal of liquid drained from aerosol cans	0.56 Euro/kg
Annual quantity of aerosol cans at Coleman Barracks, Bldg. 4b in FY 2004	503 kg
Annual operation cost without aerosol can puncturing unit calculated for 2/502nd Aviation Regiment, Bldg. 4b at Coleman Barracks	**704 Euro**
Disposal cost in FY 04	704 Euro
Capital cost for aerosol can puncturing unit	**865 Euro**
Aerosol can puncturing unit	845 Euro
Shipment to Germany	20 Euro
Annual operation costs with aerosol can puncturing unit at bldg. 4b, Coleman Barracks	**1,242 Euro**
Annual operation costs *excluding* labor costs	**236 Euro**
Labor cost at Bldg. 4b	1,006 Euro
Disposal cost of liquids drained from cans	28 Euro
Disposal of empty metal containers	208 Euro
No annual savings and negative payback period when labor is taken into account!	
Annual savings excluding labor costs	**468 Euro**
Annual operation costs excluding labor costs	**1.8 years**

5.4.5 Oil Filtering Device

Current Situation and Implementation Status/ Date:

Waste oil is generally disposed by SMT. The disposal contractor of *SMT, F.K.M Buster Altöl- und Reststoff-Entsorgung GmbH* recycles waste oil materially or energetically depending on the impurity of waste oil (e.g. contamination by antifreeze and other substances).

This P2 project is completed for all applicable locations at the USAG Mannheim. The 2/502nd Aviation Regiment and DynCorp at Bldg. 4a, Coleman Barracks, operate an oil filtering device.

P2O Description:

The mobile oil filtering unit, including an oil circulation pump, draws synthetic hydraulic oil from the helicopter, and then filters particles from the oil and pumps it back into the helicopter. The quality of the oil is tested on a regular basis by the MLC. Depending on the testing results, the filtering unit is connected to the helicopter and oil is being filtered. Thus, the quantity of new oil used during oil changes could be reduced significantly.

Advantages:

- Reduction of HW.
- Reduction of procurement and disposal costs.

Disadvantages:

- Only applicable for helicopters. Not cost-efficient for smaller vehicles.

Environmental Benefit:

- Reduction of HW.
- Conservation of resources.

5.4.6 Antifreeze Recycling

Current Situation and Implementation Status/ Date:

Used antifreeze is disposed through SMT. SMT recycles the antifreeze through G.V.S. GmbH & Co. KG or Müller Umweltdienst GmbH.

An antifreeze recycling unit was being used at the motor pool at Grünstadt AAFES facility but is currently not in use since it does not seem to be profitable anymore.

P2O Description:

There are two DoD-approved recycling systems for antifreeze: ion exchange (Deionization); and distillation. Both systems filter solids from the spent antifreeze and remove the metal ion contaminants from the solution. The recovered coolant solution often requires blending with an inhibitor package to restore it to its initial state. The two recycling systems can work with either ethylene glycol or propylene glycol, although each coolant must be processed separately. These systems are relatively simple to operate and maintain. The distillation system produces HW residue while operating the system. The ion exchange unit does not produce any liquid HW residue; however, it does require filter replacement. Deionization is generally more effective, but also more difficult and expensive to operate.

Regardless of which technology is selected, antifreeze recycling can be performed either "in-line" or “in bulk”. In-line recycling involves connecting the recycling unit directly to the vehicle, whereas bulk recycling is performed by accumulating used antifreeze from multiple vehicles and recycling it collectively. For an antifreeze recycling program to be successful, it is important to minimize the oil contamination entering the recycling unit. Oily material will foul filters, destroy ionic resins, and reduce the effectiveness of distillation units. The “in bulk” systems provide a better opportunity to check the purity of the used antifreeze than “in-line” systems. Bulk batches of antifreeze should be allowed to settle before recycling, and any oily surface layer should be skimmed off with an oil-absorbing/water repelling pad.

Advantages:

- Reduction of new antifreeze procurement.
- Reduction in quantity and costs for disposal of used antifreeze.

Disadvantages:

- Controlled blending of additives is required for recycled antifreeze to meet military specifications.
- Approval for use in tactical vehicles is required from U.S. Army's Tank-automotive and Armaments Command (TACOM).

Environmental Benefit:

- Reduction of HW generation.
- Conservation of resources through reduced procurement of new antifreeze.

Economic Feasibility/ Cost Estimate:

- The following payback period calculation is based on an antifreeze distillation device. Deionization units are significantly more expensive (approximately 12,000 Euro); therefore, a longer payback period is expected for deionization systems.

Table 6. Payback Period Calculation for Antifreeze Distillation Device

Basic Parameters	**Value**
Quantity of antifreeze needed per year without recycling unit [6]	1,700 kg
Antifreeze procurement [7]	3 Euro/kg
Annual operation cost without antifreeze distillation	**5,667 Euro/year**
Antifreeze disposal [8]	567 Euro/year
Procurement of new antifreeze	5,100 Euro/year
Capital cost for antifreeze distillation	**5,000 Euro**
Distillation unit and refractometer	5,000 Euro
Annual operation cost with antifreeze distillation	**3,141 Euro/year**
Work hours for antifreeze recycling and filter replacement	2,300 Euro/year
Procurement of new antifreeze	100 Euro/year
Procurement of corrosion inhibitors	600 Euro/year
Procurement of filters	300 Euro/year

[6] Value derived from FY 2003 used antifreeze disposal quantity by the 28th Transportation Battalion. It was conservatively assumed that the same quantity of new antifreeze is purchased.

[7] An average antifreeze price was assumed, since no HM data were available from the USAG.

[8] Value based on quantity of used antifreeze generated in FY 2003 by the 28th Transportation Battalion.

Table 6. Payback Period Calculation for Antifreeze Distillation Device

Disposal of used antifreeze	10 Euro/year
Annual cost savings after break even point	**2,526 Euro/year**
Payback period calculation	**2.7 years**

5.4.7 Bulk POL Dispensing System

Current Situation and Implementation Status/ Date:

This project is completed for applicable locations at the USAG Mannheim. Currently, the implementation of this P2O is reasonable for other facilities within the USAG Mannheim since most units either do not use large quantities of POL products or have no influence on the container size they receive. A variety of different bulk POL dispensing systems are already in use at several units or facilities at the USAG Mannheim. For example, the mobile secondary containments with wheels that are used for oil supply at MAM, stationary bulk dispensing system at the AAFES Car Care Center, Skill Development Center, Grünstadt AAFES motor pool, or 7th ARCOM ESS-X at Spinelli Barracks, Bldg. 1572.

P2O Description:

Use of a bulk POL dispensing system can reduce spills associated with the dispensing of liquids from 55-gallon drums. If large quantities of POL are needed, 55-gallon drums are preferable to 5-gallon cans or other small containers, which would unnecessarily increase the HW stream of POL metal containers. There are different systems of bulk POL dispensing systems available, depending on the content of the drums, whether the system is stationary or mobile, and whether secondary containment is necessary. A stationary POL dispensing system that costs approximately 250 Euro (including spill pallet) consists of a manually driven pump that is placed on a 55-gallon drum. There is a variety of mobile containers with wheels that are used for oil supply and that costs approximately 500 Euro. The most cost intensive system consists of a tank outside the motor pool connected to hoses or lines of a POL dispensing station within the motor pool.

Advantages:

- Likelihood of POL spills is reduced and therefore reduced disposal of POL contaminated solids and reduced procurement of new absorbent materials.

Disadvantages:

- Units or facilities may not have influence on the container sizes of the ordered material since no 55-gallon drums are usually ordered at the Supply Service Center in Bldg. 1560 at Spinelli Barracks does.

- Only feasible for facilities that use large HM or POL quantities.

- Higher risk of injury when dealing with 55-gallon drums instead of 5-gallon drums.

Environmental Benefits:

- Reduction of HW generation of HW.

- Conservation of resources through reduced procurement of new absorbent materials.

- Reduction in the potential for spills.

Economical Feasibility/ Cost Estimate:

- A payback period calculation is not possible because the costs depend on the type of bulk dispensing system installed at a given location. In addition, the potential reduction of spills cannot be quantified.

5.4.8 Waste Oil Collection Devices

Current Situation and Implementation Status/ Date:

Waste oil collection devices (e.g., oil collection wagons, movable funnels) are currently used at several units or organizations within the USAG Mannheim, such as the MAM in Bldg. 428, the Skill Development Center in Bldg. 426, Taylor Barracks or 4ASOS at Bldg. 429a, Sullivan Barracks.

However, several facilities at the USAG Mannheim need waste oil collection devices. It is anticipated that funding will be requested in November 2005 and implemented in December 2007.

P2O Description:

Waste oil can be changed quickly and without spills with the help of a waste oil suction or collection device. A variety of devices are available for collection of waste oil from the motor oil reservoir of vehicles. When a lifting ramp is used, mobile collection wagons can be utilized to capture waste oil within a tray that cost approximately 300 Euro. Those collection tanks are typically emptied with pressure. If no lifting ramp is used, suction devices that cost approximately 1,400 Euro can be utilized to pull waste oil from the motor oil tank through a hose and a vehicle-specific adapter. An overflow device indicates when the tank needs to be emptied. When oil changes take place in pits that are directly connected to a waste oil collection tank, a movable funnel, that can be placed under the vehicle and leads directly into the waste oil tank, can be constructed.

Advantages:

- Oil changes are performed faster thus less labor is required.

- Fewer spills occur and therefore generation/disposal of POL-contaminated solid is reduced.

Disadvantages:

- The motor oil reservoir cannot be completely emptied by using an oil suction wagon and residue or sludge is still left in the reservoir.

Environmental Benefits:

- Reduced HW generation of HW.

- Conservation of resources through reduced procurement of POL-absorbent materials.

- Reduction in the potential for spills.

Economical Feasibility/ Cost Estimate:

- Waste oil suction wagons cost between 300 and 2,500 Euro.

- No payback period calculation is performed because the costs vary significantly between various waste oil collection devices. Each location has different construction needs and opportunities.

5.4.9 Automatic Paint Gun Washer

Current Situation and Implementation Status/ Date:

The paint booth at Coleman Barracks, Bldg. 26 is already equipped with an automatic paint gun washer. MAM at Taylor Barracks, Bldg. 429 has a service contract for a water-based part washer for their paint booth. An EPR project for an automatic paint gun washer for the DPW paint shop was already validated and the scope of work was send to the regional contracting office (RCO) in Seckenheim in June 2005.

P2O Description:

An automatic paint gun washer cleans paint gun parts with solvent in a closed-loop system that generally includes two storage tanks: one for clean solvent, and one for used solvent. Dirty solvent is used for the initial washing cycle, and clean solvent is used for the second (final) washing cycle. The used solvent is pumped through a filter, then back into the storage tanks. The filter has to be cleaned when dirty to ensure proper functionality. Compared to manual paint gun cleaning, automatic paint gun washers offer the following advantages: 1) they require significantly less labor for cleaning paint guns, paint cups, and filters; 2) they reduce the disposal of used solvents; and 3) they reduce the procurement of new solvents. Automatic washers also produce a cleaner and thus better-functioning product than manual cleaning. VOC emissions are captured, thereby reducing exposure of VOC vapors to indoor workers. The emissions should be transferred outside through existing air emission ducts and filters.

Automatic paint gun washers are usually available for oil-based paint. There are also combined automatic paint gun washers for both water-based and oil-based paint.

Advantages:

- Reduction in procurement costs of new solvent.
- Reduction in disposal costs and quantity of used solvent.
- Reduction in labor costs.
- Improvement in cleaning result compared to manual cleaning.
- No volatile organic compounds (VOCs) emission during cleaning operations.
- Safer work environment.

Disadvantages:

- None identified.

Environmental Benefit:

- Reduced HW generation.
- Conservation of resources through reduced procurement of new solvents.

Economical Feasibility/ Cost Estimate:

- Prices of automatic paint gun washers range from 1,200 and 3,000 Euro, depending on whether the use of solvent, water or both is required.

- The following payback period calculation is based on data from FY 2003. The example is calculated for an automatic paint gun washer at the MAM.

- Less labor is required after the implementation of this P2O and therefore, labor hours are not included in this payback calculation.

Table 7. Payback calculation for automatic paint gun washer

Basic parameters	**Value**
Solvent price	2 Euro/liter
Solvent disposal at MAM in FY 2003	450 kg
Current operating costs	**1,175 Euro/year**
Solvent disposal at MAM in FY 2003	275 Euro
Solvent procurement	900 Euro
Capital cost for automatic paint gun washer	**3,056.16 Euro**
Automatic paint gun washer	2,756.16 Euro
Installation and connection with air emission duct	500 Euro
Operating costs with automatic paint gun washer[9]	**1,17.5 Euro/year**
Disposal of solvent	27.5 Euro/year
Solvent procurement	90 Euro/year
Annual savings after break even point	**1,057.5 Euro**
Payback period	**3.1**

Additional Information/Recommendation:

- If oil-based paint continues to be replaced by water-based paint, it is recommended to procure a combined automatic paint gun washer for both water- and oil-based paints.

5.4.10 Biological Parts Cleaner

Current Situation and Implementation Status/ Date:

Most facilities that perform maintenance activities use part cleaners with solvent solutions. The parts washers are usually operated under service contracts with the unit manufacturer including refilling of the station, disposal of used solvent, and repair of the cleaner.

[9] It was assumed that this P2O saves 90% of the solvent that is needed while cleaning paint guns manually.

A biological parts cleaner is in use at Spinelli Barracks, Bldg 1563 (Customer Service Team of U.S. Army BASOPS Maintenance Center-Europe - BASOPS-CST) and at the Skill Development Center at Bldg. 426, Taylor Barracks. A contract for the biological parts cleaner already exists between CB Chemie und Biotechnologie GmbH and the U.S. Army. However, as described below, an approval for use with tactical vehicles is required first. It is anticipated to include this P2O in the fall 2005 EPR and it is expected to receive funding in November 2007.

P2O Description:

Biological parts washers clean parts without the use of solvents. Cleaning is performed by microorganisms that decompose POL. A filter removes larger particles from the cleaning medium (consisting of a water-based solution containing microorganisms), which must be cleaned regularly (at least once a week). The biological parts cleaner must be heated constantly to ensure decomposition activities of the microorganisms. Depending upon the frequency of use, new medium must be added when the level in the washer drops below a certain point. Also, the cleaning medium must be changed completely, and the sludge on the bottom of the cleaner must be removed every 2 to 4 years. The sludge has to be disposed of as POL contaminated liquids and sludges.

Advantages:

- No procurement costs for solvent.
- No generation of used solvent.
- No VOCs emissions.

Disadvantages:

- Maintenance of biological parts cleaner must be performed by the unit or organization (e.g. refilling and changing of media).
- Generation of HW sludge.
- Currently, only manual biological part cleaners are available.
- Approval for use for tactical vehicles is required from TACOM.

Environmental Benefits:

- No VOCs are emitted.
- Reduced HW generation of HW.
- Conservation of resources through reduced procurement of cleaning medium.

Economical Feasibility/ Cost Estimate:

- The payback period for the biological part cleaner depends on the frequency of services that are provided. In the following calculation, an average value (based on information provided by Safety Kleen) was used for the substituted solvent parts cleaner maintenance contract involving maintenance service every 3 months.

Table 8. Payback Calculation for Solvent and Biological Parts Cleaner

Basic parameters	**Value**	**Unit**
Operating cost for solvent part cleaner	**1,410**	**Euro/year**
Maintenance contract (Safety Kleen)	1,410	Euro/year
Capital cost for biological part cleaner	**2,086.84**	**Euro**
Biological part cleaner "Bio-Circle"[10]	2,086.84	Euro
Operation cost for biological part cleaner	**781.60**	**Euro/year**
Energy use	50	Euro/year
Refilling with media	480	Euro/year
Change of media every 2 years	200	Euro/year
Disposal of media every 2 years	5	Euro/year
Labor cost for cleaning of filter (5 minutes every week)	36	Euro/year
Labor cost for disposal and cleaning of part cleaner 1h every 2 years	11	Euro/year
Cost savings per year after break even point	**628**	**Euro/year**
Payback period	**2.5**	**years**

5.4.11 Use of Smaller Sized Containers/Reuse of Paint

Current Situation and Implementation Status/ Date:

This P2O is implemented for all applicable sites at the USAG Mannheim. It was recently implemented at the DPW Self Help Shop and the SORT Center.

P2O Description:

To reduce waste associated with leftover paint during smaller (touch-up) paint projects, the size of paint containers available at the Self Help Shop was reduced in FY 2004. If larger quantities of paint are needed, DPW personnel calculate a detailed estimate of the amount needed for the specific painting activity. Orders for larger amounts of paint must be authorized in advance.

Containers with remaining (and still usable) paint can be returned to the DPW Self Help Shop or the SORT Center, where they are made available to other customers for reuse.

Advantages:

- Reduction in quantity of paint waste.
- Reduction in disposal costs.

[10] The prices are based on data from CB Chemie and Biotechnologies GmbH

Disadvantages:

- None identified.

Environmental Benefits:

- Reduction in HW.

5.4.12 Reuse of US-Manufactured Compressed Gas Cylinders through DRMO

If compressed gas cylinders produced in the U.S. are no longer needed by a unit but can still be used, DRMO is requested to notify other facilities and units within USAREUR that U.S. manufactured compressed gas cylinders are available for use. If no other facility or unit has a need for the cylinders, they must be disposed via a local company that is very cost prohibitive. This P2O is already implemented.

5.4.13 Substitution of U.S. Gas Cylinders with German Gas Cylinders

In FY 2003, compressed gas cylinders were mainly generated at the DPW warehouse, at various units and at the SORT Center. A large quantity of gas cylinders was disposed through the DPW warehouse due to 1) the transition from gas cylinders produced in the U.S. to German gas cylinders within the DPW Shops; and 2) the accumulation of compressed gas cylinders over the last few years.

Current Situation and Implementation Status/ Date:

Nearly all compressed gas cylinders used by the military units are gas cylinders produced in the U.S. U.S. manufactured gas cylinders are refilled by a company in the Netherlands since they are not accepted by German companies, due to different sizes, pressure, and valves.

In general, the units no longer need many compressed gas cylinders because less welding activities are performed onsite, and some welding operations are conducted by local contractors. If compressed gas cylinders produced in the U.S. are no longer needed by a unit but can still be used, DRMO is requested to notify other facilities and units within USAREUR that U.S. manufactured compressed gas cylinders are available for use. If no other facility or unit has a need for the cylinders, they must be disposed of via a local company that is very cost prohibitive.

This P2O is already implemented at the DPW welding shop.

P2O Description:

German gas cylinders can be used instead of U.S. manufactured gas cylinders where feasible. They are usually rented and can be easily refilled. When empty or no longer needed, gas cylinders can be returned to the rental company.

Advantages:

- Reduction of HW.

- Reduction in disposal costs.

Disadvantages:

- Not feasible for all motor pools/ facilities since German gas cylinders can not be connected to U.S. welding equipment due to different size, pressure, and valves. Motor pools would have to change their entire welding equipment, which is not feasible since welding activities at the motor pools are decreasing.

- When substituting U.S. gas cylinders with German gas cylinders, U.S. gas cylinders will have to be disposed if no other unit or facility needs them.

Environmental Benefit:

- Generation of HW is reduced and resources are saved through reduced procurement of compressed gases.

5.4.14 Procurement of Reusable Vehicle Fire Extinguishers

In general, German and U.S. wall fire extinguishers can be refilled by the USAG Mannheim Fire & Emergency Services Division, and are only disposed if broken or damaged. However, vehicle fire extinguishers from the U.S. cannot be refilled by the Fire & Emergency Services Department since the technical equipment for refilling and the manpower is not available. FY 2003 waste disposal records indicate that both wall and vehicle fire extinguishers were discarded through the Fire & Emergency Services Division, from the SORT Center, and military units themselves. Procurement and disposal of vehicle fire extinguishers can be reduced if reusable fire extinguishers are purchased through the local market.

Current Situation and Implementation Status/ Date:

Non-recyclable vehicle fire extinguishers are currently purchased from the U.S. through the DRMO in Kaiserslautern. These vehicle fire extinguishers expire after 1 year and cannot be refilled and recertified by the USAG Fire & Emergency Services Division. Instead, both the extinguishers and extinguisher residue must be disposed as HW.

Several units, including the 28th Transportation Battalion, already purchase their vehicle fire extinguishers through the local market. Since this P2O will be funded and implemented by the unit themselves, no implementation date is available. However, information about this P2O is distributed by the Fire & Emergency Services Division.

P2O Description:

Reusable/ recertifiable vehicle fire extinguishers can be purchased on the local (German) market. Reusable German fire extinguishers are typically valid for 2 years, after which they must be serviced and refilled on the local market. After 10 years, the German fire extinguishers must be either 1) inspected and approved by the TÜV (*Technischer Überwachungsverein)*; or 2) replaced.

Advantages:

- German vehicle fire extinguishers expire after 2 years, whereas U.S. fire extinguishers expire after 1 year.

- German vehicle fire extinguishers can be refilled, whereas U.S. extinguishers must be disposed as HW.

- Based on their longer “shelf life” and local availability, a stock of German vehicle fire extinguishers can be stored on-site, and thus are immediately accessible for replacement in a vehicle. In contrast, U.S. vehicle fire extinguishers cannot be locally purchased and can only be obtained through a one-for-one exchange through the DRMO.

Disadvantages:

- None identified. There are no compromises in extinguisher quality or ease of use.

Environmental Benefits:

- Reduced generation of HW.

- Conservation of resources through reduced procurement of non-recyclable U.S. manufactured extinguishers.

Economical Benefits/ Cost Estimate:

- DRMO Kaiserslautern labor costs for procurement and shipment of U.S. fire extinguishers were not taken into account.

Table 9. Payback Calculation for Vehicle Fire Extinguisher

Basic Parameters	**Value**
Labor cost	30 Euro/h
Weight of fire extinguishing residue	6 kg/piece
Weight of fire extinguishing canister	3.5 kg/piece
Disposal cost of canisters	1.32 Euro/kg
Disposal cost of extinguisher residue	1.02 Euro/kg
Annual operating costs per U.S. extinguisher	**50.74 Euro/piece**
New U.S. vehicle fire extinguisher[11]	40 Euro/piece
Disposal cost of canister per piece	4,62 Euro
Disposal cost of vehicle fire extinguisher per piece	6,12 Euro
Annual operating costs per German extinguisher	**10.5 Euro/piece**
Maintenance costs of German extinguisher every 2 years	15 Euro/2 years
Labor cost for shipment of extinguishers for maintenance to company (assumption: 2 hours for 10 fire extinguishers)	6 Euro/piece/2 years
Capital cost for German fire extinguisher	**67 Euro/piece**
New vehicle fire extinguisher with permanent pressure[12]	29 Euro/piece
New fitting for fire extinguisher on vehicle	23 Euro/piece

[11] Price for vehicle fire extinguisher is based on First Alert FESA5. Price includes shipping costs.

[12] The prices and weight of the German vehicle fire extinguisher are based on data from TOTAL Feuerschutz GmbH, Ladenburg.

Table 9. Payback Calculation for Vehicle Fire Extinguisher

Labor cost for installation of new fitting	15 Euro/piece
Annual savings after break even point	**40.24 Euro/piece/year**
Payback period	**1.7 years**

Additional Information and Recommendations:

- Development of a procurement policy for fire extinguishers would encourage the success of this P2O. Units must be provided with contact information for German market fire extinguishers, and be informed of the potential cost savings.
- It is recommended that units combine their purchases of German vehicle fire extinguishers to take advantage of cost savings for larger quantity procurements.

5.4.15 Substitution of Oil-Based Paint with Water-Based Paint

Current Situation and Implementation Status/ Date:

At the DPW paint shop and FFEMA in Friedrichsfeld, water-based paint is used whenever possible but depending on application purposes, no adequate water based paint is available or only at a much higher price. Thus, solvent based paint is still in use.

For military purposes, CARC is used in order to provide maximum camouflage and chemical warfare resistance. The CARC paint used is solvent-based which is high in VOCs and in other hazardous air pollutants (HAPs). In January 2004, Army National Guard authorized the use of water dispersible CARC (WD CARC).

MAM, one of the biggest CARC users at the USAG, has transitioned from solvent-based CARC to WD CARC in August 2005 after a test phase and after using up its stock of solvent-based CARC. MAM is performing painting activities in building 429 at Taylor Barracks and at the 512th Maintenance Company's paint booth in building 1852 at Spinelli Barracks. The paint booth at the 2/502nd Aviation Regiment still uses solvent-based CARC but efforts have been taken to revise their technical manual in order to be allowed to use WD CARC. It is anticipated to implement this P2O until April 2006.

P2O Description:

Since February 2004, the use of WD CARC has been approved for military purposes. The new WD CARC paint contains no HAPs and is very low in VOCs. Solvent-based CARC has to be mixed with a solvent-based thinner that contains HAPs and VOCs whereas the new WD CARC can be mixed with inexpensive distilled water. The new WD CARC is safer for the environment and has also improved flexibility, mar resistance, and outdoor durability compared to conventional CARC. During the application of paint, one-third less paint is used and the service life is expected to increase up to 100%. There are two types of WD CARC available, but it is recommended to use Type II due to the better quality.

The use of WD CARC may require new equipment, e.g. new paint guns (steel instead of aluminum paint guns) or new cleaning equipment (water instead of solvent). Personal protective equipment can still be used. The WD CARC can be ordered by using the national stock number (NSN) list or qualified product list (QPL). The list has been approved by United Stated Army Research Laboratory (ARL) which is the approving authority for all DoD activities regarding CARC. However, tests and training on handling and application of WD CARC should be performed before implementing this P2O at the USAG Mannheim.

Advantages:

- Excellent chemical properties: flexibility, mar resistance, outdoor durability.
- Reduction in procurement costs due to increased service life and less paint needed for application.
- Reduction of costs due to mixture of WD CARC with distilled water instead of solvent-based thinner.
- Less VOC emissions and no HAP emissions.
- Improvement of workers health.

Disadvantages:

- Technical manual for aviation needs approval.
- Longer drying times.
- Further tests required until WD CARC can be used at MAM and at the Airfield.

Environmental Benefits:

- No use of solvent.
- Low in VOC emissions.
- No HAPs.

Economic Feasibility / Cost Estimate:

- The following payback period calculation was calculated for the paint booth of the 2/502nd Aviation Regiment at Coleman Barracks, Bldg. 26. It was not taken into account that due to the change from CARC to WD CARC, paint gun cleaning will be performed using inexpensive and not hazardous distilled water instead of thinner. This will even increase the savings. In addition, cost savings resulting from increased service life were not taken into account.

Table 10. Payback Period Calculation For Substitution Of Solvent-Based CARC with WD CARC

Annual operating costs with solvent-based CARC	**40,000 $/year**
Price of solvent-based CARC	104 $/gall
Price of thinner	9 $/gall
Price of mixture of solvent-based CARC and thinner with ratio 3:1	80 $/gall
Annual quantity of CARC used at paint booth Bldg. 26, Coleman Barracks	500 gall/year
Capital costs for implementation of WD CARC	**$10,000**
New paint guns (steel instead of aluminum paint guns) and new cleaning equipment	$10,000
Annual operating costs with WD CARC	**22,440 $/year**

Table 10. Payback Period Calculation For Substitution Of Solvent-Based CARC with WD CARC

Price of WD CARC kit (3QT WD CARC + 1QT distilled water)	68.00 $/gall
Annual quantity of WD CARC used at Bldg. 26, Coleman Barracks	330 gall/year
Annual saving after break even point	**17,560 $/year**
Payback period of WD CARC implementation	**0.6 years**

Additional Information:

- WD CARC has already been utilized at several installations across the United States. Through onsite tests, it was determined that WD CARC can be applied in varied environments with similar quality results.

5.5 POTENTIAL POLLUTION PREVENTION INITIATIVES

5.5.1 Proper HM Management / Procurement of German Products

Many problems that arise with HM procurement from the U.S., such as additional transportation costs or long delivery periods, can be avoided by buying German products rather than American products. Through elimination of long delivery periods, storage of large quantities of HM can be avoided. Long delivery periods and therefore a large quantity of stored HM are often the cause for expired material that cannot be extended and must be disposed. Disposal and material procurement costs can be saved through proper HM management that is often only possible with German products. As long as orders are below $ 500,000, the U.S. Army (OCONUS) is allowed to buy German products. This P2O has to be implemented by the units themselves although information and training will be provided by the P2 Manager. Thus, no implementation date is available.

5.5.2 Fuel Tank and Dispensing System

Current Situation and Implementation Status/ Date:

Fuel from helicopters has to be removed during maintenance activities but cannot be reused after the helicopter is repaired. Waste fuel is currently disposed together with waste oil through SMT. The USTs used for waste oil by the 2/502nd Aviation Regiment at Coleman Barracks do not have a proper filling platform and pipes are single walled. The tanks are anticipated to be upgraded. This P2O has to be paid by the unit themselves since no environmental funds are currently available for this project. Thus, no implementation date is available.

P2O Description:

The fuel removed from the helicopters during maintenance activities cannot be reused by the helicopters although it is still good. However, the fuel could be used by other transportation units at Coleman Barracks. A tank including a fuel dispensing system should be built to collect fuel removed during maintenance activities.

Advantages:

- Reduction in HW and related disposal costs.
- Reduction of fuel procurement.

Disadvantages:

- Building tank and fuel dispensing system is cost intensive.

Environmental Benefits:

- Reduction in HW.
- Preservation of resources.

Economical Feasibility/ Cost Estimate:

- Construction of one UST for waste oil and one for fuel including a pump station, and the removal of two waste oil USTs and one waste fuel UST will cost approximately 200,000 Euro.

5.5.3 Bypass Filters

Current Situation and Implementation Status/ Date:

The largest quantity of waste oil is generated from vehicle engine and machine maintenance activities at the USAG's motor pools. For the past few years, motor oil was tested on a regular basis by the MLC as part of the Army Oil Analysis Program (AOAP). The AOAP ensured that oil was changed only when necessary, thereby saving oil procurement costs and reducing waste oil generation. However, the AOAP has been cancelled, and motor oil changing methods and frequencies have reverted to manufacturer specifications (i.e. every 20,000 kilometers (km)), rather than when the motor oil is proved to be spent.

It is anticipated to include this P2O in the 2005 Fall EPR and it is expected to receive the funding and implement the project in November 2007.

P2O Description:

Bypass filters are designed to remove smaller particulates than would be removed by an engine's normal filter, reducing the need for oil changes. Most internal-combustion engines are equipped with a full-flow motor oil filter system, which typically filters relatively large particles (i.e. greater than 35 micrometers (µm) in diameter). A bypass filter removes moisture and fine particles (as small as 0.1 µm in diameter) thus improving the quality of the motor oil, and reportedly extending engine life by up to a factor of five. The bypass filter system consists of a metal filter case and a cellulose filter element. This bypass filter element must be changed every 15,000 to 100,000 km, according to manufacturer specifications. Oil losses occur during oil and bypass filter changes by taking out the cellulose filter that is saturated with oil. Due to that fact and due to natural oil level decrease, motor oil has to be added. If the bypass filter is properly maintained and motor oil is added as necessary, motor oil can be changed as little as every 150,000 to 600,000 km (performance variability is based upon the specific bypass filter manufacturer). A bypass filter can be installed in most non-tactical vehicles, such as passenger cars and trucks. For tactical vehicles, the use of bypass filters must be approved by the appropriate military authority, TACOM. Depending upon the motor oil tank volume, different sizes of bypass filters are available. The first installation of a bypass filter system takes approximately four hours.

Advantages:

- Significant reduction in the number of required oil changes through procurement and installation of bypass filters.
- Reduction in the quantity of used oil, the disposal costs, and the procurement of motor oil.
- Reduction in labor for motor oil changes.
- Extension of engine life.

Disadvantages:

- Bypass filters are only feasible for vehicles that require frequent motor oil changes, and that are expected to operate for several years or more.

- Bypass filters are feasible for use in non-tactical vehicles. Approval for use in tactical vehicles is required through TACOM.

Environmental Benefits:

- Reduced HW generation.

- Conservation of resources through reduced procurement of new motor oil. Extension of engine life reduces vehicle procurement and disposal.

Economical Feasibility/ Cost Estimate:

- The payback calculation is provided for bypass filters from the following manufacturers: Trabold Filter GmbH and TopÖl Neffgen GmbH (see Vendor Contact Information, Appendix A).

Table 11. Payback Calculation for Bypass Filter

Basic Parameters		**Value**
Price of motor oil [13]		1 Euro/l
Waste oil disposal		0.2 Euro/kg
Waste filter element disposal		0.38 Euro/kg
Labor cost		40 Euro
Labor for normal oil change		1 hour
Labor for first installation of bypass filter		4 hours
Labor for change of filter element		0.5 hours
Example for Freightliner		**Specifications**
Oil Tank Volume of Freightliner		38.8 l
Average kilometers		45,000 km/year
Oil change interval (without AOAP)		20,000 km
Average quantity of motor oil added		5 l/year
Comparison of Bypass Filter Manufacturers	**TopÖl**	**Trabold**
Change of filter element [km]	20,000	20,000
Oil change with bypass filter [km]	150,000	600,000-1.2Mio
Mass of filter element saturated with oil [kg]	0.5	1
Filter case + periphery [Euro]	278	387
Filter element [Euro]	22	13.97
Operating costs per year without bypass filter	**194.76**	**194.76**
Motor oil procurement [Euro]	87.30	87.30

[13] HM data were not available from the Supply Support Activity (SSA) of the 574th Supply Company (Spinelli Barracks, Bldg. 1563). Data on costs and type of the specific motor oil used at the USAG Mannheim were thus not available; this payback calculation is based upon an average motor oil price.

Table 11. Payback Calculation for Bypass Filter

Waste oil disposal [Euro]	17.46	17.46
Labor for oil change [Euro]	90.00	90.00
Capital costs for bypass filter	**438.00**	**547.00**
Bypass filter procurement [Euro]	278.00	387.00
Labor for first emplacement of bypass filter [Euro]	160.00	160.00
Operating costs per year with bypass filter	**99.93**	**82.29**
Procurement of filter element [Euro]	5.00	5.00
Labor for change of filter element [Euro]	49.50	31.43
Waste filter element disposal [Euro]	45.00	45.00
Motor oil added [Euro]	0.43	0.86
Annual savings after break even point [Euro/year/vehicle]	**94.83**	**112.47**
Payback period of bypass filter [years]	**4.6**	**4.8**

Additional Information and Recommendations:

- Bypass filters are successfully used by several German shipping, bus and disposal companies, such as Aldi GmbH & Co.KG Helmstadt, Wertstoffeinsammlung GmbH in Hamburg, M.Werner GmbH & Co, and *Stadverwaltung* Wertheim.

5.5.4 Reusable Oil Filters

Current Situation and Implementation Status/ Date:

Used filters are generated from engine oil, hydraulic fluid, transmission fluid, and fuel system changes and service. When the filters are removed from a vehicle, they contain a residue of fluid within the filter element.

It is anticipated to include this P2O in the 2005 Fall EPR and it is expected to receive the funding and implement the project until November 2007.

P2O Description:

Reusable filters for vehicle motor oil can be cleaned and used many times. Reusable filters are full-flow filtration units that contain a reusable, stainless steel wire filter installed in a serviceable housing. This filter removes contaminants more effectively than paper element spin-on filters. In addition, it can be cleaned and reused many times, reducing the frequency of used filter disposal.

The filter is comprised of the housing and an element that should be cleaned during normal vehicle oil changes. Reusable oil filters are installed in the same manner as traditional filters and do not require any additional equipment or fittings. Furthermore, they can be moved from vehicle to vehicle, so the capital investment in the filter will not be lost if a vehicle is later taken out of service. The filters can be used in a wide range of vehicles including General Motors, Chrysler, Ford, Cummins, Caterpillar, Volvo, Mercedes, Perkins, and others.

In comparison to traditional paper element filters, reusable filters can remove up to 40% more iron, copper, lead, tin, and aluminum; reduce up to 50% more silicon (sand and dirt); and reduce the depletion rate of the oil additive package by as much as 20%. In addition, when coupled with an engine oil analysis program, these filters can extend engine oil life by as much as 67%.

Advantages:

- Prolonged engine life and extended oil change intervals when coupled with an oil analysis program.
- Reduced quantity of used oil filter and waste oil.
- Reduced disposal costs.

Disadvantages:

- Additional (though minimal) labor required for cleaning of elements.
- Approval for use in tactical vehicles is required from TACOM.

Environmental Benefits:

- Reduced HW generation.
- Conservation of resources through reduced procurement of oil filters.
- Extended oil change intervals and thus reduced quantity of waste oil.

Economical Feasibility/ Cost Estimate:

- The Baseline Inventory does not include sufficient data for calculation of the payback period. Therefore, the calculation is based on data from the AFCEE Transportation Pollution Prevention Model Shop Report, July 1998.
- The payback period was calculated for an automobile or light truck and an average reusable filter capital cost of 200 Euro. Costs for reusable filters for automobiles or light trucks range from 180 to 300 Euro. Reusable filters for larger diesel engines range from 450 to 550 Euro.

Table 12. Payback Calculation for Reusable Oil Filter

Annual operational cost without reusable filter	**51 Euro/year**
Filter disposal	3 Euro/year
Filter procurement	48 Euro/year
Filter changes per year	8
Capital cost for reusable filter	**200 Euro**
Reusable filter	200 Euro
Annual operation cost for reusable filter	**20 Euro/year**

Table 12. Payback Calculation for Reusable Oil Filter

Labor for cleaning filter	20 Euro/year
Annual saving after break even point	**31 Euro/year**
Payback period of reusable filter	**10 years**

Additional Information:

- Appropriate military authority (TACOM) for making process changes should be sought and obtained prior to procuring or implementing process changes.

5.5.5 Washable Rags

Current Situation and Implementation Status/ Date:

Most units and organizations buy rags from Self Service Supply Center (SSSC). Some organizations in Taylor Barracks also use old clothes from the SORT Center.

MAM at Bldg. 428 at Taylor Barracks currently runs a test phase with washable rags.

P2O Description:

Instead of buying rags, washable rags can be provided by a contractor (e.g., MEWA Textil-Service AG & Co) that replaces the dirty rags with clean rags. The dirty rags are then washed by the contractor.

Advantages:

- HW reduction.
- Reduction of procurement of new rags.

Disadvantages:

- MEWA Textil-Service contract for washable rags is always for one year and cannot be interrupted in case a unit is going to deploy.

Environmental Benefit:

- HW reduction.

Cost estimate:

- The cost estimate given below was calculated for MAM. Costs for washable rags are based on prices from MEWA Textil-Service AG & Co.

Table 13. Cost estimate for washable rags

Basic data	**Value**
Rags at SSSC	0.93 /kg

Table 13. Cost estimate for washable rags

Mass of washable rags	40 kg/1000 pieces
Quantity of POL contaminated solids at MAM in FY 04	3,600 kg
Quantity of used rags in FY 04 [14]	1,200 kg
Disposal costs of used rags in FY 04	540 Euro
No capital costs	**-**
Operation costs of one-way rags	**1.38 Euro/kg**
Disposal of one-way rags	0.45 Euro/kg
Procurement new rags	0.93 Euro/kg
Operating costs washable rags	**0.83 Euro/kg**
Renting, washing, service, and transportation of washable rags	33 Euro/40kg
Total annual savings per kilogram rags	**0.55 Euro/kg**
Total annual savings for MAM in FY 04 [15]	**665 Euro/year**

[14] Assumption: 1/3 of POL contaminated solids generated at MAM in FY 04 are used rags, 2/3 are used absorbent material.

[15] Example calculated for disposal costs and disposal quantity of POL contaminated solids generated by MAM, Bldg. 428, Taylor Barracks in FY 2004.

6 SOLID WASTE

6.1 GOAL

Ensure that the non-hazardous solid waste generation per capita is reduced continuously and that the diversion of non-hazardous solid waste is increased continuously.

6.2 BASELINE AND PROGRESS

The following data were taken from the FY03 and FY04 SWAR reports. Solid Waste data excludes construction and demolition debris.

Non-Hazardous Solid Waste

	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Diversion Rate [%]	53.6	57.47					
Solid Waste Disposed [US tons]	6,145	5,804					
Solid Waste Recycled [US tons]	7,093	7,844					
Daily waste generation per capita [lbs/person/day]	6.19	6.08					
USAG Population	10,661 [16]	12,303 [17]					

6.3 DESCRIPTION OF MAJOR SOLID WASTE STREAMS

According to the Baseline Inventory, the following major solid waste streams are generated at the USAG Mannheim. In regard to the amount generated, mixed recyclables represent the largest portion and sewage sludge the smallest portion.

- Mixed recyclables
- Food waste
- Construction & demolition debris

[16] USAG Population in FY 2003: Resident: 7,128, Non-Resident: 3,533

[17] USAG Population in FY 2004: Resident: 6,916, Non-Resident: 5,387

- Wood
- Cardboard
- Electronics
- Street sweepings
- Lead-acid batteries
- Tires
- Metals
- Sewage sludge
- Colored paper

6.4 CURRENT AND ONGOING POLLUTION PREVENTION INITIATIVES

6.4.1 SORT Center

All types of items can be brought to the SORT Center where it is made available for other residents (e.g., household materials that can be reused). The SORT Center is located at Bldg. 405b in the Taylor Barracks.

6.4.2 Recycling Information Guide (RIG) – Recycling Program

A RIG including information on the separation and the classification of solid waste was developed in 2003. The RIG is distributed to newcomers to the USAG Mannheim during Earth Week and EQCC meetings, and is available at the Service Order desk.

6.4.3 Electronic Waste - Disposal through DRMO

Current Situation and Implementation Status/ Date:

At the USAG Mannheim, electronic waste is accumulated at the SORT Center. The electronic waste is currently disposed through SMT.

The USAG recently started to implement the P2O described below.

P2O Description:

Electronic waste can be disposed through DRMO. The disposal costs include only costs for labor and transportation. To implement this opportunity, additional containers must be provided at the SORT Center to collect and sort electronic waste. When containers are full, O&M personnel would transport them to DRMO Kaiserslautern.

Advantages:

- Reduced disposal costs for electronic waste.

Disadvantages:

- Costs for labor and equipment for transportation of electronic scrap to DRMO Kaiserslautern.
- Costs for initial procurement of containers.

Environmental Benefits:

- Electronic waste is already recycled in an environmentally sound manner.

Economic feasibility/cost estimate:

- In the following payback period calculation, it was assumed that two containers will be necessary to sort electronic waste at the SORT Center. It was assumed that one container will cost approximately 5,000 Euro.

Table 14. Payback Calculation for the Disposal of Electronic Waste Through DRMO

Basic parameters	**Value**
Cost of equipment for transportation[18]	30 Euro/hour
Labor cost for transportation[19]	30 Euro/hour
Transportation to DRMO Kaiserslautern (one way)	1 hour
Annual quantity of electronic waste in FY03	8,020 kg
Approx. number of transportations to Kaiserslautern per year	10 per year
Capital Cost of collection containers	**10,000 Euro**
2 collection containers	10,000 Euro
Current operating costs	**4,010 Euro**
Disposal of electronic waste in FY03	4,010 Euro
Operating cost with P2 alternative	**1,200 Euro per year**
Labor cost and transportation to DRMO Kaiserslautern	1,200 Euro per year
Annual savings after break even point	**2,810 Euro**
Payback period	**3.6 years**

[18] Cost of equipment for transportation includes mileage allowance and is based on DPW, O&M data.

[19] Labor cost for O&M personnel.

6.5 POTENTIAL P2 INITIATIVES

6.5.1 Tire Mounting Machine

Current Situation and Implementation Status/ Date:

Tires and metal rims from the SORT Center are currently not separated and are disposed together as HW.

A tire mounting machine is currently in use at the Skill Development Center (Bldg. 426, Taylor Barracks).

It is anticipated to include this P2O for the SORT Center in Bldg. 405b at Taylor Barracks in 2005 Fall EPR and it is expected to receive the funding and implement the project in November 2007.

P2O Description:

A tire mounting machine separates tires from the metal rims. Rims can be sold as scrap metal or precious metal through DRMO. If a tire mounting machine is available and tires and rims are separated, it is possible to dispose of tires without rims through DRMO Kaiserslautern without any disposal costs except of costs for labor and transportation.

Advantages:

- The quantity of used tires as HW is reduced by at least 25 % (by mass) by separating the rims from the tires prior to disposal.

- Rims of iron or aluminum and tires are disposed through DRMO without any costs except for labor and transportation costs.

Disadvantages:

- Additional labor costs are required for operation of tire mounting machine and transportation of scrap metal and tires to DRMO.

Environmental Benefits:

- Quantity of used tires as HW is reduced.

- Conservation of resources by recycling or reusing rims.

Economical Feasibility/ Cost Estimate:

- Labor costs for the operation of the tire mounting machine are not included in the calculation, because SORT Center personnel can operate the tire mounting machine during any down time that is available while at the SORT Center.

Table 15. Payback calculation for tire disposal

Basic parameters	**Value**
Disposal of tires (with or without rims)	0.28 Euro/kg

Table 15. Payback calculation for tire disposal

Basic parameters	**Value**
Cost of equipment and vehicle[20]	18 Euro/hour
Labor cost for transportation[21]	22 Euro/hour
Transportation to DRMO Kaiserslautern (one way)	1 hour
Price for scrap metal (assumed)[22]	100 Euro/t
Annual quantity of tires with/ without rims (SWAR FY03)	16 t/year
Annual quantity of rims (assumed)[23]	4 t/year
Rims per transportation	30 rims/transportation
Average mass of car rim	12 kg/rim
Number of transportations to Kaiserslautern per year	11 /year
Capital Cost	**9,130 Euro**
Tire mounting machine[24]	4,130 Euro
Collection container for tires at SORT Center	5,000 Euro
Current operating costs	**4,480 Euro/year**
Disposal tires with rims	4,480 Euro/year
Operating cost with P2 alternative	**480 Euro**
Labor cost and transportation to DRMO Kaiserslautern	880 Euro/year
Reward for scrap metal	400 Euro/year
Annual savings after break even point	**4,000 Euro**
Payback period	**2.3 years**

[20] Cost of equipment for transportation includes mileage allowance and is based on DPW, EMD data.

[21] Labor costs for SORT center personnel.

[22] The payment that the USAG would receive from DRMO for iron or aluminium rims could not be identified. Thus, the actual scrap metal price as of February 2005 was assumed as the price for these materials.

[23] There was no exact data available for the amount of rims that are currently disposed as hazardous waste along with the tires. Thus, rims are assumed to represent 25 % of the total mass of rims and tires currently being disposed. Data is provided by DPW EMD.

[24] Price of the tire mounting machine is based on data provided by Adolf Würth GmbH & Co. KG.

6.5.2 Office Recycling Initiative

Current Situation and Implementation Status/ Date:

Not all offices within the USAG Mannheim recycle. Containers for yellow bags, paper and refuse are provided outside the buildings but not inside all of the offices. The P2O described below is currently in the implementation phase.

P2O Description:

Provide containers for yellow bags and paper at all offices.

Advantages:

- Increased recycling rate.
- Cost reduction. The disposal of paper and yellow bags is for free contrary to refuse disposal.

Disadvantages:

- Cooperation of USAG employees is required.

Environmental Benefits:

- Separately collected waste can be recycled.

Economical Feasibility/ Cost Estimate:

- Cost reduction. The disposal of paper and yellow bags is free whereas for refuse, 291 Euro are paid per ton.

7 AIR EMISSIONS

7.1.1 Goal

The USAG's goal is to show a continuous annual reduction in air emissions.

7.1.2 Baseline and Progress

The Air Emission Inventory from November 2001 and several air emission reports from August 2003 and September 2004 include information on pollutants measured for each facility. Depending on the type of pollution source, the following pollutants were measured: particulate matter (PM), sulfur dioxide (SO_2), carbon monoxide (CO), Nitrogen Oxides (NO_x), VOCs, and other parameters.

7.2 DESCRIPTION OF MAJOR EMISSION SOURCES

All major air emissions sources listed below except for the combustion engine test stands at Bldg. 1373, Coleman Barracks and at Bldg. 429, Taylor Barracks are built before 1998 and therefore, do not require a permit according to 4. BImSchV.

Coal-fired heating facility:

- Friedrichsfeld QM Service Center, Bldg. 1043.
  Air emission testing on PM, SO_2, NO_x, CO is performed as required.

Oil-fired heating facilities:

- Taylor Barracks, Bldg. 433.
  The facility has a capacity of 837kW.

- Dannenfels, Bldg. 2456.
  The facility has a capacity of 203kW.

Natural gas-fired heating facilities:

- Gruenstadt AAFES Depot, Bldg. 3556.
  The facilities have a combined capacity of 11,730kW.
  The facilities are regularly tested on PM, SO2, NOx, and CO emissions.

- Gruenstadt, Bldg. 3555 (AAFES bakery)
  The total capacity (10 units) of the facility is 3,694 kW.
  The facility is regularly tested on PM, SO_2, NO_X, and CO emissions.

Internal combustion engines with a capacity of more than 70kW:

- Emergency Generators in Dannenfels and Friedrichsfeld.
  The capacity of the generators are 500 kW and 660 kW.

Combustion engine test stands:

- Coleman Barracks, Bldg. 1373, 2/502nd Aviation Regiment
    - Two engine test stands with a capacity of 3,357kW and 1,044 kW manufactured in 1992 in the U.S. were shipped to Mannheim in 1999.
- Taylor Barracks, Bldg. 429, MAM
    - Two engine test stands with a capacity of 448 kW and 128kW.
      The engine test stands are regularly tested on NOx, VOC, and PM emissions.
    - A new engine test stand is partially permitted. MAM applied for a full permit in February 2005.

Paint booths:

- Friedrichsfeld, Bldg. 1042
- Taylor Barracks, Bldg. 429, MAM
- Spinelli Barracks, Bldg. 1852
- Coleman Barracks, Bldg. 26
- Taylor Barracks, Bldg. 359, DPW

Cold solvent cleaning tanks

- Taylor Barracks: Bldgs. 338, 348, 351, 399
- Spinelli Barracks: Bldgs.1504, 1522, 1563, 1567, 1570, 1572, 1852
- Sullivan Barracks: Bldgs. 211, 218, 235, 249a
- Gruenstadt Bldgs. 355, 3570

Abrasive blasting

- Taylor Barracks, Bldg. 428
- Coleman Barracks, Bldg. 4a

ODS

According to the ODS survey dated October 2004, ODS class I substances R12 and R502 are still in use in 16 pieces of equipment including refrigeration units, ice cube makers, coolers, freezers, and a A/C split unit.

Fueling stations

- Benjamin Franklin Village

- Coleman Barracks
- Friedrichsfeld QM Area
- Gruensstadt
- Spinelli Barracks
- Sullivan Barracks
- Turley Barracks

Welding Shop

- Taylor Barracks, Bldg. 359

Carpentry shop

- Taylor Barracks, Bldg. 359

7.3 IMPLEMENTED AND ONGOING POLLUTION PREVENTION INITIATIVES

7.3.1 Replacement of ODS I Equipment

95% of ODS I equipment was replaced by October 2004.

7.3.2 Obtain Full Permit for Engine Test Stand

Measures to reduce the air emissions are recently established at the combustion engine test stand at Bldg. 429, Taylor Barracks to obtain the full permit (see Chapter 4.2.2).

7.3.3 Upgrade Air Treatment System, Friedrichsfeld QM Service Center, Bldg. 1042

Air emission testing performed at the Bldg. 1042 paint booth in August 2003 and September 2004 indicated that paint booth emissions exceeded regulatory standards. An additional filter was installed and proof testing has been done in May 2005. The air emission report from July 2005 showed that no threshold exceedances could be detected.

7.4 POTENTIAL POLLUTION PREVENTION INITIATIVES

7.4.1 General P2 Opportunities

A review of the available air emission reports for the USAG Mannheim, combined with information gathered during site visits and interviews, suggest that a common cause of excess air emissions over the past years at the USAG is from inconsistent implementation of existing environmental policies and procedures. Most air emission exceedances can be prevented by ensuring that each of the following steps is taken:

- Proper design review procedures should be followed to identify potential types and quantities of air emissions. It should be determined whether additional air treatment will be necessary. The air treatment design should be reviewed to ensure that the type of treatment technology is appropriate and the treatment system is sufficient in size for the expected pollutant stream.

- An air emissions permit should be obtained for the equipment to be operated if required. If a permit is deemed necessary, the permit should be kept up to date. Many potential emissions-related problems can be identified and remedied during the permitting process, with the help of the regulatory agency.

- Recurring training and supervision of all staff regarding proper equipment operation and maintenance should be provided. An operation and maintenance manual should be supplied and a schedule of routine tasks should be performed. It should be communicated to supervisors/facility managers that they are responsible for ensuring that required maintenance tasks are completed properly and on time.

- A routine air emissions testing and records maintenance program should be followed in the future, as prescribed by the site-specific permit, and/or as outlined in the operation and maintenance manual.

- If equipment has been operated and maintained properly and air emissions still exceed regulatory standards, it should be determined whether air treatment needs to be added or the existing equipment needs to be upgraded.

- It should be continually assessed how changes in system operations (e.g. use of a new material, a change in air flow volume) will impact air emissions. Particular attention should be paid to aging equipment, which will likely require additional maintenance and repairs towards the end of its life cycle.

Most of the above described steps are already taken into account in order to ensure compliance with emission thresholds from the FGS or host nation regulations. Nearly all emission exceedances have been immediately rectified.

7.4.2 Raise Bakery Stack, Grünstadt AAFES

According to Grünstadt AAFES staff, vicinity residents filed complaints with local law enforcement about odors from the AAFES bakery. Currently, the main bakery exhaust stack is approximately roof height, which does not allow for adequate dispersion of the exhaust. Instead, the exhaust settles near ground level, where it comes into contact with workers and nearby residents. Raising the main bakery stack to at least six feet above the bakery roof would improve atmospheric mixing and dispersion of the bakery exhaust, thereby preventing odors from settling in vicinity neighborhoods. The stacks for the bakery ovens have already been raised, which appears to have contributed to a reduction of odors in the vicinity.

8 WATER AND WASTEWATER

8.1.1 Goal

The USAG's goal is to show a continuous annual reduction in potable water consumption and in wastewater generation.

8.1.2 Baselines and Progress

Water Consumption (cubic meters [m³] per year)							Target: Continuous Reduction
FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
1,147,000	910,737						

Wastewater Generation (cubic meters [m³] per year)							Target: Continuous Reduction
FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
1,042,823	883,709						

8.2 IMPLEMENTED AND ONGOING POLLUTION PREVENTION INITIATIVES

8.2.1 Procurement of Water Saving Appliances

There are several initiatives within the DPW for the procurement of water saving appliances and devices (e.g., the job description of DPW Warehouse personnel contains the procurement of water saving devices, such as water flow reducers, aerators ("Perlatoren"), water saving faucets and shower heads.) However, as the State Construction Agency („Staatliches Hochbauamt") is responsible for the planning and construction of new buildings at the USAG Mannheim, the responsible person at the O&M for water conservation (Water Manger) is not included in the planning of new buildings. The Water Manager should be included in the planning phase of new buildings or should give recommendations for integration of water saving measures into the catalogue of specifications ("Anforderungskatalog").

8.2.2 Awareness Programs

Regular awareness trainings are being held by DPW personnel for Newcomers, or are held during Earth Day in Schools. Additionally, leaflets were prepared concerning the conservation of energy, water, fuel and waste that are distributed during various events, such as the EQCC meeting.

8.3 POTENTIAL POLLUTION PREVENTION INITIATIVES

8.3.1 Installation of Water Metering

Although residential units are not individually metered, they are considered by USAG staff to be one of the greatest users of water. According to USAG housing staff, general conservation policies and education are provided to residents, but conservation cannot be individually monitored or enforced. Because residents are not billed for their water use, they generally are not aware of their water use rates, and there is no incentive to reduce water use.

A P2O identified for reduction of residential water use is the random metering of residential water. Water meters should be installed at each building/facility and monitored for at least one month. The monitored residences/facilities would receive a mock “billing”, which would show the amount of water they used, and how much that water would cost if they had actually been billed for these services. This type of metering program has been implemented at Army installations in the United States, and has been shown to substantially decrease the amount of residential water use. Together with the mock “billing”, leaflets and brochures on possibilities of water saving could be provided to the households. To maximize the possibility of voluntary water conservation, the USAG can establish incentive programs to recognize the residential areas or neighborhoods that achieve the greatest sustained reduction in water usage.

Monitoring of water use at other types of facilities at the USAG could similarly result in a decrease in consumption. Metering of water at facilities such as commissaries, maintenance units, warehouses, and office buildings would allow implementation of incentive programs based on water use goals. Meeting these conservation targets would be the responsibility of the facility managers and staff supervisors. With the availability of water use data and a specific reduction goal, managers can better educate and motivate staff to implement conservation policies already in place, or to discover new opportunities for improving conservation.

The installation of water meters cost at least 400 EUR per meter. The costs increase depending on the intended location of the meters within the piping system.

9 VEHICLE FUEL CONSERVATION

9.1 GOALS

No P2 goals regarding vehicle fuel use are given in the new P2 metrics.

9.2 BASELINES AND PROGRESS

VEHICLE FUEL USE							Target:
Fuel type	Baseline	total gallons consumed at the USAG Mannheim					No target
-	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
JP 8	521,221	528,344					
MOGAS	335,190	309202					

9.3 IMPLEMENTED AND ONGOING POLLUTION PREVENTION INITIATIVES

No P2 initiatives have been initiated yet.

9.4 POTENTIAL P2 INITIATIVES

9.4.1 Awareness program

A general P2 awareness presentation was held at an EQCC meeting including fuel conservation methods. An ongoing awareness program should be started regarding how fuel can be conserved by using car pools, going short distances by bike or by foot, or if stopping for longer than 10 seconds by turning off the motor.

9.4.2 Develop Fleet Procurement Guidelines

According to USAG personnel, a procurement policy for the non-tactical vehicle fleet has not been developed for the USAG Mannheim. Development of a procurement policy is a crucial step toward obtaining the P2 goals for fuel consumption and efficiency. By defining the types of vehicles that are most appropriate and cost-effective to operate in specific situations, procurement costs can be significantly reduced. A fleet procurement policy for the USAG should include, at a minimum, the following components:

- Purchase European vehicles on the local market, rather than shipping vehicles from the United States. Set a goal for the minimum percentage of non-tactical vehicles purchased on the local market.
- Purchase standard transmission vehicles where possible, which generally cost less and are more fuel-efficient.

- Purchase diesel vehicles whenever possible. Set a goal for the minimum percentage of diesel vehicles in the non-tactical fleet (a minimum of 50% of passenger vehicles is suggested as the first milestone).

- Develop guidelines for determining the most cost-effective and fuel-efficient vehicle for a given application. Purchase the most fuel-efficient vehicle that is feasible for a particular application. For example, hybrid vehicles, which have very high fuel efficiency and use a fuel (unleaded gasoline) that is readily available at the USAG, may be an excellent option for smaller passenger cars.

- Investigate the feasibility of purchasing alternative- or dual-fuel vehicles as replacements for the non-tactical fleet. Although these vehicles currently do not appear to be feasible for use at the USAG, changes in fuel and vehicle technologies will likely increase their opportunities for implementation in the near future. For example, biodiesel currently can be used instead of commercial diesel in most diesel vehicles. However, many vehicle manufacturers will void the engine warranty if biodiesel is used, and availability of biodiesel is still limited. As biodiesel use gains acceptance, its use at the USAG will likely become an excellent P2O.

Implementation of these policies will produce the following benefits:

- Use of fuel-efficient vehicles will reduce petroleum hydrocarbon consumption and greenhouse gas emissions, and will reduce fleet operational costs.

- Purchasing the smallest vehicle that is feasible for a given application will reduce vehicle fuel consumption and will reduce vehicle procurement costs.

- Capital costs will likely be less for vehicles purchased on the local market than for vehicles shipped from the U.S. Also, fewer resources are used to transport the vehicles to the purchaser if the vehicles are procured locally.

9.4.3 Provide Onsite Diesel Fueling Stations

The September 2004 inventory of non-tactical vehicles at the USAG Mannheim indicates that all passenger vehicles are fueled almost entirely by unleaded gasoline. Diesel-fueled vehicles comprise only a small fraction of the fleet, and are largely for special uses only (e.g. buses, fire trucks, waste collection trucks). Diesel-fueled passenger vehicles purchased on the local market are generally more fuel-efficient, less expensive to purchase and, if maintained properly, have a longer engine life than gasoline-fueled vehicles.

As discussed in Section 10.1, a significant P2O for the USAG Mannheim is to increase the number of non-tactical diesel-fuel vehicle purchases. However, a major obstacle to implementing this P2O is the lack of onsite diesel fueling stations. Currently, only JP8 and unleaded gasoline are available at the USAG. Diesel fuel must be purchased offsite using fuel coupons, which is a deterrent to the purchase and use of diesel vehicles. Therefore, it is recommended that diesel fueling stations are provided in convenient locations throughout the USAG if it proves to be feasible to encourage the procurement and use of non-tactical diesel vehicles.

10 ENERGY CONSERVATION

10.1 GOAL

The P2 goal regarding energy conservation is to reduce facility energy consumption by 30% per square foot by 2005 and 35% by 2010 from a 1985 baseline. Note that the Executive Order 13123 allows for a separate, less stringent goal for industrial and laboratory activities. However, the USAG Mannheim does not track energy consumption separately for such activities. As a result, the 30-35% (more stringent) reduction goal will apply to the USAG as a whole.

10.2 BASELINE AND PROGRESS

Building type	Baseline	Energy Consumption (MBTUs/ft²)					Target: See Table 1
	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Standard Buildings	0.056	0.065					
Industrial Facilities	0.857	0.729					

10.3 CURRENT AND ONGOING POLLUTION PREVENTION INITIATIVES

The following P2Os are partly implemented and are ongoing since implementation of conservation measures requires consistent application of program components such as education, goal setting and incentives, and supervision and accountability of staff.

10.3.1 Energy Manager

At the USAG Mannheim, an Energy Manager is appointed who is responsible for managing and implementing an energy saving program.

10.3.2 Energy Awareness Programs

Regular awareness trainings are being held by DPW personnel (Energy Manager) for Newcomers, during Earth Day in Schools, and during other events.

10.3.3 Installation of Photovoltaic Panels

Currently, photovoltaic roof panels are in operation at four buildings at Coleman Barracks (Bldgs. 57, 87, 88, and 99). These panels provide approximately 6% of the electricity used at the USAG. The estimated annual energy production from the panels is approximately 12,000 kWh.

This P2O involves the installation of solar electrical (photovoltaic) panels at selected USAG facilities to provide part or all of their power supply. Photovoltaic panels can be procured on the local market, and

are easily installed. Although photovoltaic power systems would most easily be integrated into the construction of new buildings, older buildings could be easily retrofitted as well, provided the roof is in adequate condition. Panels can also be installed on structural elements, such as barrier walls, and can be used to supply power to outdoor equipment.

The primary environmental benefit of solar electricity is the reduction in greenhouse gases. The DPW estimated the annual reduction in greenhouse gases from the panels at Coleman Barracks is: 9 pounds of CO_2, 57 pounds of NO_x, and 102 pounds of SO_x.

10.4 POTENTIAL POLLUTION PREVENTION INITIATIVES

10.4.1 Inspection and Repair of Compressed Air Systems

Compressed air systems use a lot of energy. Compressed air systems should be regularly inspected for leaks since most compressed air systems contain leaks that could be easily fixed and thereby save money.

10.4.2 Installation of Utility Metering

Although residential units are not individually metered, they are considered by USAG staff to be one of the greatest users of utilities. According to USAG housing staff, general conservation policies and education are provided to residents, but conservation cannot be individually monitored or enforced. Because residents are not billed for their water and energy use, they generally are not aware of their utility use rates, and there is no incentive to reduce utility use.

A P2O identified for reduction of residential utility use is the random metering of residential utilities. Water and power use meters should be installed at each building/facility and monitored for at least one month. The monitored residences/facilities would receive a mock “billing”, which would show the amount of energy they used, and how much that energy would cost if they had actually been billed for these services. This type of metering program has been implemented at Army installations in the United States, and has been shown to substantially decrease the amount of residential energy use. Together with the mock “billing”, leaflets and brochures on possibilities of energy and water saving could be provided to the households. To maximize the possibility of voluntary utility conservation, the USAG can establish incentive programs to recognize the residential areas or neighborhoods that achieve the greatest sustained reduction in utility usage.

Monitoring of utility use like water, energy, and compressed air consumption at other types of facilities at the USAG could similarly result in a decrease in consumption. Metering of utilities at facilities such as commissaries, maintenance units, warehouses, and office buildings would allow implementation of incentive programs based on utility use goals. Meeting these conservation targets would be the responsibility of the facility managers and staff supervisors. With the availability of utility use data and a specific reduction goal, managers can better educate and motivate staff to implement conservation policies already in place, or to discover new opportunities for improving conservation.

The installation of energy and water meters cost at least 400 EUR per meter. The costs increase depending on the intended location of the meters within the piping system.

10.4.3 Lighting Conservation

In nearly every facility visited at the USAG Mannheim, opportunities for energy conservation exist through modification of the type or the manner in which lighting was used. During the P2OA site visits, it was observed that the amount of lighting used was generally greater than necessary for that application. For example, many facilities had areas that actually received little use, but were brightly lighted at all times. Other facilities have adopted measures for adjusting the amount of lighting to the lowest level that is practical for the primary use of the space. An example is the commissary at Sullivan Barracks, which turns on only half of the available lighting during daylight hours in areas not used by the public, such as the warehouse. Daylight is generally more than sufficient to make up for the reduced use of artificial light. In areas that receive little use, the lights are left off unless the space is occupied. During nighttime hours, most lights are turned off, and the lighting used is reduced to the minimum amount possible. For instance, the number of lights used to stock shelves is a fraction of the amount used when the store is open to the public.

Development of site-specific practices such as these are easily implemented and a cost-free method for reducing electricity use. However, for these measures to be effective, staff must be educated in conservation policies and practices, and supervisors/facility managers must be accountable for the implementation of these policies. Metering and setting a reduction goal for electricity use, as described in Section 8.1.1, can be an excellent incentive for staff to implement lighting conservation measures.

Lighting conservation products are an excellent and cost-effective tool for reducing electricity use. These products rely on mechanical means to reduce electricity use to the minimum amount possible, rather than relying on individual energy users. Lighting conservation equipment works by either turning lights down or off when not needed, or by making the existing lighting more efficient. These products are readily available, can be easily and inexpensively installed, and generally quickly pay for themselves through reduced electricity costs.

At the USAG Mannheim, the State Construction Agency („Staatliches Hochbauamt") is responsible for the planning and construction of new buildings. Currently, neither the O&M nor the Energy Manager from the USAG Mannheim is included in the planning of new buildings. The Energy Manager should be included in the planning phase of new buildings or should give recommendations for integration of energy saving measures into the catalogue of specifications ("Anforderungskatalog").

The following P2Os for lighting conservation products can be easily implemented in a variety of settings.

Occupancy Sensors

Occupancy sensors ensure lights are only on when someone is in a room. With many models these sensors can reduce energy consumption 15 to 80 %, depending on usage. Replacing fixtures with T5 or T8 compact fluorescents will save more energy. Occupancy sensors are typically used for restrooms, employee break rooms, storage areas, and office spaces that rarely require light during 24 hours a day. At the USAG Mannheim, occupancy sensors are currently installed in restrooms (e.g., Bldg. 346, Taylor Barracks).

Daylight Dimming

Dimming Controls to compensate for day lighting are appropriate for virtually any type of facility where the lights operate much of the time and where a significant quantity of daylight is provided with windows and skylights. Daylight dimming can reduce lighting costs from 35 to 70 %.

Exterior Lighting

The use of photocells ensures that outside lights operate only at night. Metal halide and other high-intensity discharge (HID) lamps last longer than either incandescent or mercury-vapor sources.

Lighting Reflectors

Through installation of lighting reflectors (e.g. WINFLEX reflector), 30 to 40 % of the lighting system can be uninstalled due to the better lighting results. Reflectors can be attached to lamps very easily.

10.4.4 Inspection and Repair of Refrigeration Units

Consistent implementation of an inspection and repair program for refrigeration units can result in substantial energy savings. The amount of power required to keep a refrigeration or freezer unit to the required temperature can significantly increase if the unit is not properly maintained. Leaks in a refrigeration unit result in more energy being consumed to maintain a specified air temperature. In some cases, such as Bldg. 3559A at the Grünstadt AAFES Depot, the energy losses in a refrigeration unit are so great that repair of the unit is no longer feasible and the unit must be decommissioned.

If not maintained properly, even relatively new refrigeration units can quickly develop inefficiencies due to ice buildup or system leaks. An example is the commissary at Sullivan Barracks, which is approximately five years old. Although the freezer cases are relatively new, they must be monitored frequently for ice buildup within the cases and on the compressors themselves. The ice buildup results in the compressor consuming more energy to keep the unit at the same temperature. The commissary has increased its inspection frequency, which has resulted in greater cooling efficiency, and will also increase the life of the compressor.

10.4.5 Inspection and Repair of Boiler Piping, Grünstadt AAFES

A site visit and interview were conducted at the natural gas boiler at Grünstadt AAFES (Bldg. 3556) to investigate P2Os for power and water use. The natural gas boiler supplies power to the AAFES production plants, including the bakery and refrigeration units. Information collected during the site visit indicated the boiler piping was fairly old, and had developed numerous small leaks over time. A number of seemingly minor leaks can add up to a significant loss of heat and steam, and increase the use of both natural gas and water. Regular inspection and prompt repair of the boiler piping is easily implemented and a cost effective way of reducing power and water losses. DPW has implemented a Best Management Practice (BMP) for inspection and repair of boiler/steam systems, which can, with adequate funding, be used as a guide for repairs and management of the boiler at Grünstadt.

10.4.6 Roof Repairs, Grünstadt AAFES

The roof at the main production building (Bldg. 3555) at Grünstadt AAFES has developed numerous leaks, which has allowed the insulation to become saturated with rainwater. In addition to creating a safety hazard from the increased water weight on the roof, the insulating capacity of the roof has been compromised. Patching of the roof was conducted in an attempt to fix the leaks, but the patching was both ineffective and extremely expensive. The roof also needs to be sloped as runoff is directed onto the roof of the refrigeration units, where it causes further leakage. Because of the high power consumption at the AAFES production plants, installation of photovoltaic roof panels would be an excellent option for reducing power costs and the use of fossil fuels. However, installation of solar panels would not be feasible until the roof is replaced.

10.4.7 Consolidate/Construct Storage Facilities, Grünstadt AAFES

The Grünstadt AAFES compound contains several aging buildings or portions of buildings that are used primarily for storage (e.g. Bldg. 3559). Insulation of these storage areas is generally extremely poor, but renovation is not economically feasible due to the age and overall condition of the buildings. Decommissioning of these areas would be recommended solely due to safety concerns. For instance, the concrete floors are badly damaged in most areas, which create a hazard for forklift traffic. It is recommended that a new, energy-efficient warehouse is constructed at the Grünstadt compound that can accommodate its future storage needs. The new warehouse would involve the demolition of older buildings and decommissioning of storage areas within other buildings. In addition to reducing power use, a new structure would allow the installation of photovoltaic panels, which would further reduce energy costs.

10.4.8 Install Heat Recovery Units, Grünstadt AAFES

Heat-producing equipment is in use at several locations within the AAFES production facility in Grünstadt. Heat recovery units can be installed on heat producing equipment, thereby accessing and reusing the heat for other purposes. For example, the bakery ovens - one of the largest energy users at the AAFES compound - could be retrofitted with heat recovery units. The heat recovered from the ovens could then be used for other applications, such as heating wash water. Heat recovery units have been purchased for the boiler system in the ice cream plant; however, they have not yet been installed.

11 AFFIRMATIVE PROCUREMENT

11.1 GOALS

The main goals for affirmative procurement (AP) are to train procurement officers and integrate AP into developing plans, work statements, and specifications.

11.2 IMPLEMENTED AND ONGOING POLLUTION PREVENTION INITIATIVES

11.2.1 Guidelines for Procurement of Water and Energy Saving Appliances

As outlined in chapter 8.2.1 and 10.4.3, guidelines and procurement policies have partly been established but should be established USAG wide for water saving appliances and devices. Especially during planning and construction of new buildings through the State Construction Agency, water and energy conservation issues should be included in the catalogue of specifications.

11.3 POTENTIAL POLLUTION PREVENTION INITIATIVES

11.3.1 Fleet Procurement Guidelines

As outlined in chapter 9.4.12, fleet procurement guidelines should be developed for the procurement of new vehicles.

11.3.2 Awareness Program for Integration of Affirmative Procurement

A P2 awareness training program should be established for personnel concerned with purchasing. The P2 training should include guidelines regarding procurement of water and energy efficient products or other environmentally friendly products, e.g., products that are made of recycled materials (recycled paper, etc.), biobased products (e.g. biobased lubricants), products labeled with the Blue Angel, or Energy Star labeled products should be preferred.